

CHAPTER 1

DRAINAGE REVIEW AND REQUIREMENTS



CITY OF ISSAQUAH 2011 ADDENDUM TO THE 2009 KING COUNTY, WASHINGTON SURFACE WATER DESIGN MANUAL

(Effective October 31, 2011 per Ordinance 2625)

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CHAPTER 1

DRAINAGE REVIEW REQUIREMENTS

The City of Issaquah adopts the 2009 King County Surface Water Design Manual (King County Manual) for the design, construction and maintenance of stormwater management systems and facilities that are approved through the development permit process. Included in the adoption of the King County Manual is this 2011 City of Issaquah Surface Water Design Addendum (Addendum), which revises Chapters 1 and 2 of the King County Manual to reflect City of Issaquah-specific requirements. The reference section of the King County Manual is not adopted by the City.

The requirements in this Addendum differ from the King County Manual in four primary ways:

1. Modified thresholds and requirements to more closely match Department of Ecology requirements, particularly for projects under 1.0 acre in size,
2. Conform to City permit submittal, review, and approval requirements,
3. Identify specific design standards and details allowed by the City of Issaquah, and
4. Include stormwater Low Impact Development (LID) requirements.

This chapter replaces the Chapter 1 of the King County Manual and describes the drainage review procedures and types, the drainage requirements, and the adjustment procedures necessary to implement surface water runoff policies codified in Chapter 13.28 of the Issaquah Municipal Code (IMC). It also provides direction for implementing the more detailed procedures and design criteria found in Chapters 3-6 of the King County Manual.

The intent of this Addendum is to comply with the thresholds, definitions, minimum requirements and exceptions, adjustment and variance criteria in Appendix I of the City's NPDES Western Washington Phase II Municipal Stormwater Permit. The City shall refer to Appendix I of the Phase II permit to help interpret the requirements of this Addendum, should any discrepancies be found. This interpretation shall not affect City standards contained herein or in IMC Chapter 13.28 or Chapter 16.30 that purposely exceed the minimum requirements of the Phase II Permit.

Chapter Organization

The information presented in Chapter 1 is organized into four main sections as follows:

- Section 1.1, "Drainage Review"
- Section 1.2, "Core Requirements"
- Section 1.3, "Special Requirements"
- Section 1.4, "adjustment Process"

Formatting of Chapter Text

The text of Chapter 1 and subsequent chapters has been formatted using the following conventions to aid the user in finding, understanding, and properly applying the thresholds, requirements, and procedures contained in this manual:

- **Italic** is used to highlight the following: (a) terms when they are first introduced and defined within the same paragraph; (b) special notes that supplement or clarify thresholds, requirements, and procedures; (c) sentences considered important for purposes of understanding thresholds, requirements, and procedures; and (d) titles of publications.
- **Bold italic** is used to highlight terms considered key to understanding and applying drainage review thresholds, requirements, and procedures. These are called "key terms" and are defined below. This convention applies after the key term is defined and does not necessarily apply to tables and figures.
- **Bold** is used to highlight words and phrases that are not key terms but are considered important to emphasize for purposes of finding and properly applying thresholds, requirements, and procedures.

Key Terms and Definitions

Proper application of the drainage review and requirements in this chapter requires an understanding of the following key terms and their definitions. Other key terms may be defined in subsequent chapters. All such key terms are highlighted in **bold italic** throughout the manual. Other important terms that are not key terms are defined in the text when they are first introduced. These are highlighted in italic when they are first introduced but are not highlighted throughout the manual. All terms defined in this chapter are also found in the "Definitions" section of this manual as are other important terms defined throughout the Manual.

Construct or modify means to install a new drainage pipe/ditch or make improvements to an existing drainage pipe or ditch, for purposes other than *maintenance*,¹ that either serves to concentrate previously unconcentrated surface and storm water runoff or serves to increase, decrease, or redirect the conveyance of surface and storm water runoff. Construct or modify does not include installation or maintenance of a driveway culvert installed as part of a single family residential building permit.

Civil engineer means a person licensed by the State of Washington as a professional engineer in civil engineering.

Conveyance system nuisance problem means a flooding or erosion problem that does not constitute a ***severe flooding problem*** or ***severe erosion problem*** and that results from the overflow of a constructed conveyance system for runoff events less than or equal to a 10-year event. Examples include inundation of a shoulder or lane of a roadway, overflows collecting in yards or pastures, shallow flows across driveways, minor flooding of crawl spaces or unheated garages/outbuildings, and minor erosion.

Critical aquifer recharge area is the critical area designation, defined and regulated in IMC 18.10.796 and IMC 13.29, containing groundwater protection standards to protect the Issaquah Creek Valley aquifer from degradation and depletion. The intent is to minimize loss of recharge quantity, to maintain the protection of supply wells for public drinking water, and to prevent contamination of groundwater.

Erosion hazard area is the critical area designation, defined and regulated in IMC 18.10.520, that is applied to areas underlain by soils that are subject to severe erosion when disturbed. Erosion hazard areas have specific requirements on clearing, including seasonal limitations and allowed extent. Erosion hazard areas are reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

¹ *Maintenance* means those usual activities taken to prevent a decline, lapse, or cessation in the use of currently serviceable structures, facilities, equipment, or systems if there is no expansion of the structure, facilities, equipment, or system and there are no significant hydrologic impacts. Maintenance includes the repair or replacement of non-functional facilities and the replacement of existing structures with different types of structures, if the repair or replacement is required to meet current engineering standards or is required by one or more environmental permits and the functioning characteristics of the original facility or structure are not changed. For the purposes of applying this definition to the thresholds and requirements of this manual, the City of Issaquah will determine whether the functioning characteristics of the original facility or structure will remain sufficiently unchanged to consider replacement as maintenance.

Existing site conditions means those that existed in May 1979 (when King County first required flow control facilities) as determined from aerial photographs and, if necessary, knowledge of individuals familiar with the area, unless a drainage plan for land cover changes has been approved by the City of Issaquah or King County since May 1979 as part of a *development*² permit or approval. If so, existing site conditions are those created by the *site* improvements and drainage facilities constructed per the approved drainage plan.

Flood hazard area is the areas of special flood hazard designation, defined and regulated in IMC 16.36.

Permitting of activities located in Areas of Special Flood Hazard (the 100-year floodplain as mapped on Federal Emergency Management Agency Flood Insurance Rate Maps) is done through the Flood Hazard Permit, not through drainage review. Areas of special flood hazard is also a critical area designation, defined and regulated in IMC 16.36, which are also reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

Fully dispersed means the runoff from an impervious surface or non-native pervious surface has dispersed per the criteria for fully dispersed surface in Section 1.2.3.2.C (p. 1-41).

Groundwater protection areas include the **Critical Aquifer Recharge Area** (CARA) as defined in IMC 18.10.796 and IMC 13.29, Groundwater Quality Protection Standards.

High-use site means a commercial or industrial site that (1) has an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area; (2) is subject to petroleum storage or transfer in excess of 1,500 gallons per year, not including delivered heating oil; or (3) is subject to use, storage, or maintenance of a fleet of 25 or more diesel vehicles that are over 10 tons net weight (trucks, buses, trains, heavy equipment, etc.). Also included is any road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements. For the purposes of this definition, *commercial and industrial site* means that portion of a *site's* developed area associated with an individual commercial or industrial business (e.g., the area occupied by the business's buildings and required parking).

Historic site conditions means those that existed on the *site* prior to any development in the Puget Sound region. For lands not currently submerged (i.e., outside the ordinary high water mark of a lake, wetland, or stream), historic site conditions shall be assumed to be forest cover unless reasonable, historic, *site*-specific information is provided to demonstrate a different vegetation cover.

Land disturbing activity means any activity that results in a change in the existing soil cover, both vegetative and non-vegetative, or the existing soil topography. Land disturbing activities include, but are not limited to demolition, construction, clearing, grading, filling, excavation, and compaction. Land disturbing activity does not include tilling conducted as part of agricultural practices, landscape maintenance, or gardening.

Landslide hazard area is the critical area designation, defined and regulated in IMC 18.10.560, that is applied to areas subject to severe risk of landslide due to topography, soil conditions, and geology. See also Seismic hazard area. Landslide hazard areas are reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

Major receiving water means a large receiving water that has been determined by King County to be safe for the direct discharge of increased runoff from a proposed project without a flow control facility, subject to the restrictions on such discharges set forth in Core Requirement #3, Section 1.2.3. Lake Sammamish is the only major receiving water in Issaquah. Major receiving waters are also considered safe for application of Basic WQ treatment in place of otherwise required Enhanced Basic WQ treatment (see Section 1.2.8.1).

Native vegetated surface means a surface in which the soil conditions, ground cover, and species of vegetation are like those of the original native condition for the *site*. More specifically, this means (1) the soil is either undisturbed or has been treated according to the "native vegetated landscape" specifications in Appendix C, Section C.2.1.8; (2) the ground is either naturally covered with vegetation litter or has been top-dressed with 4 inches of hog fuel consistent with the native vegetated landscape specifications in Appendix C; and (3) the vegetation is either (a) comprised predominantly of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and that reasonably could have been expected to occur naturally

² *Development* means any activity that requires a permit from the City of Issaquah for review and approval.

on the *site* or (b) comprised of plant species specified for a native vegetated landscape in Appendix C. Examples of these plant species include trees such as Douglas fir, western hemlock, western red cedar, alder, big-leaf maple and vine maple; shrubs such as willow, elderberry, salmonberry and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

Natural discharge area means an onsite area tributary to a single **natural discharge location**.

Natural discharge location means the location where surface and storm water runoff leaves (or would leave if not infiltrated or retained) the *site* or **project site** under **existing site conditions**.

New impervious surface means the permanent addition of a hard or compacted surface like roofs, pavement, gravel, or dirt; or the addition of a more compacted surface, like paving over a previously existing dirt or gravel.

New pervious surface means the conversion of a **native vegetated surface** or other native surface to a non-native pervious surface (e.g., conversion of forest or meadow to pasture land, grass land, cultivated land, lawn, landscaping, bare soil, etc.), or any alteration of existing non-native pervious surface that significantly increases surface and storm water runoff (e.g., conversion of pasture land, grass land, or cultivated land to lawn, landscaping, or bare soil; or alteration of soil characteristics).

New PGIS means **new impervious surface** that is **pollution-generating impervious surface**.

New PGPS means **new pervious surface** that is **pollution-generating pervious surface**.

Pollution-generating impervious surface (PGIS) means an impervious surface considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those that are *subject to vehicular use*³ or storage of *erodible or leachable materials, wastes, or chemicals*,⁴ and that receive direct rainfall or the run-on or blow-in of rainfall.⁵ Metal roofs are also considered to be PGIS unless they are treated to prevent leaching.

Pollution-generating pervious surface (PGPS) means a non-impervious surface considered to be a significant source of pollutants in surface and storm water runoff. Such surfaces include those subject to use of pesticides and fertilizers, loss of soil, or the use or storage of erodible or leachable materials, wastes, or chemicals. Such surfaces include, but are not limited to, the lawn and landscaped areas of residential or commercial *sites*, golf courses, parks, sports fields, and grassed modular grid pavement.

Project site means that portion of a *site* and any offsite areas subject to proposed project activities, alterations, and improvements including those required by this manual.

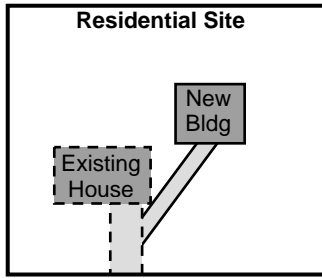
Redevelopment project means on a site that is already substantially developed (defined as having 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities.

³ *Subject to vehicular use* means the surface, whether paved or not, is regularly used by motor vehicles. The following surfaces are considered regularly used by motor vehicles: roads, unvegetated road shoulders, bike lanes within or not separated from the traveled lane of a roadway, driveways, parking lots, unfenced firelanes, diesel equipment storage yards, and airport runways. The following surfaces are not considered regularly used by motor vehicles: road shoulders primarily used for emergency parking, paved bicycle pathways, bicycle lanes adjacent to unpaved or paved road shoulders primarily used for emergency parking, fenced firelanes, and infrequently used maintenance access roads.

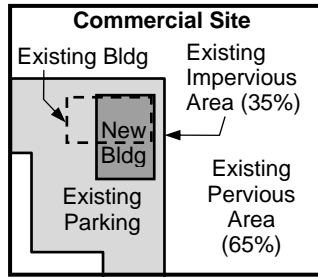
⁴ *Erodible or leachable materials, wastes, or chemicals* are those substances that, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff (examples include erodible soil, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, garbage dumpster leakage, etc.).

⁵ A covered parking area would be considered pollution-generating if runoff from uphill could regularly run through it, or if rainfall could regularly blow in and wet the pavement surface. The same parking area would not be included if it were enclosed by walls or if a low wall and berm prevented stormwater from being blown in or from running onto the covered area.

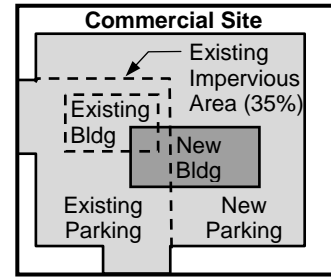
A Redevelopment Project that Adds New Impervious Surface



A Redevelopment Project that Replaces Impervious Surface



A Redev Project that Adds and Replaces Impervious Surface



Replaced impervious surface means for structures, the removal and replacement of any horizontal exterior impervious surfaces or foundation that generates rainfall runoff. For other impervious surfaces, the removal down to bare soil or base course and replacement.

Replaced PGIS means **replaced impervious surface** that is **pollution-generating impervious surface**.

Seismic hazard area is the critical area designation, defined and regulated in IMC 18.10.570, that is applied to sites containing mapped seismic hazard areas. Seismic hazard areas are reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

Severe building flooding problem means there is flooding of the *finished floor area*⁶ of a *habitable building*,⁷ or the electrical/heating system of a habitable building for runoff events less than or equal to a 100-year event. Examples include flooding of finished floors of homes and commercial or industrial buildings, or flooding of electrical/heating system components in the crawl space or garage of a home.

Severe erosion problem means there is an open drainage feature with evidence of or potential for erosion/incision sufficient to pose a sedimentation hazard to downstream conveyance systems or pose a landslide hazard by undercutting adjacent slopes. Severe erosion problems do not include roadway shoulder rilling or minor ditch erosion.

Severe flooding problem means a **severe building flooding problem** or a **severe roadway flooding problem**.

Severe roadway flooding problem means there is flooding over all lanes of a *roadway*,⁸ or a *sole access driveway*⁹ is severely impacted, for runoff events less than or equal to the 100-year event. A severely impacted sole access driveway is one in which flooding overtops a culverted section of the driveway, posing a threat of washout or unsafe access conditions due to indiscernible driveway edges, or flooding is deeper than 6 inches on the driveway, posing a severe impediment to emergency access.

Single family residential project means any project that (a) constructs or modifies a single family dwelling unit or duplex, (b) makes improvements (e.g., driveways, roads, outbuildings, play courts, etc.) or clears native vegetation on a lot that contains or will contain a single family dwelling unit or duplex, or (c) is a plat, short plat, or boundary line adjustment that creates or adjusts lots that will contain single family dwelling units.

⁶ **Replaced impervious surface** includes impervious surface that is moved from one location to another on the project site, where the area from which the impervious surface is moved from will be restored to the same or better runoff discharge characteristics as the area being covered by the moved impervious surface.

⁷ **Finished floor area**, for the purposes of defining **severe building flooding problem**, means any enclosed area of a building that is designed to be served by the building's permanent heating or cooling system.

⁸ **Habitable building** means any residential, commercial, or industrial building that is equipped with a permanent heating or cooling system and an electrical system.

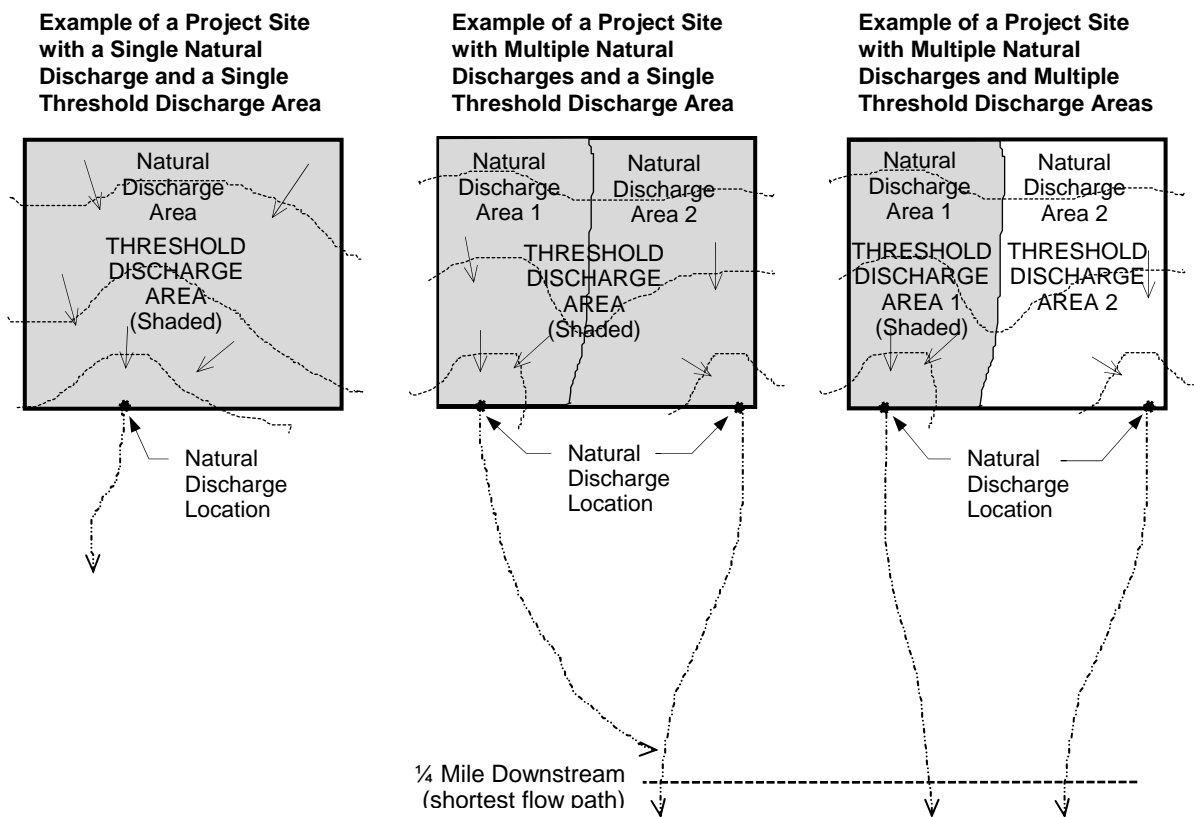
⁹ **Roadway**, for the purposes of this definition, means the traveled portion of any public or private road or street classified as such in the *City of Issaquah Street Standards*.

¹⁰ **Sole access driveway** means there is no other unobstructed, flood-free route for emergency access to a habitable building.

Site (a.k.a. *development site*) means a single parcel, or two or more contiguous parcels that are under common ownership or documented legal control, used as a single parcel for purposes of applying for authority from the City of Issaquah to carry out a development/project proposal. For projects located primarily within dedicated rights-of-way, *site* includes the entire width of right-of-way within the total length of right-of-way subject to improvements proposed by the project.

Steep slope hazard area is the critical area designation, defined and regulated in IMC 18.10.580, that is applied to areas on a slope of 40% or more within a vertical elevation change of at least 10 feet. Steep slope hazard areas are reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

Threshold discharge area means an onsite area draining to a single *natural discharge location*, or multiple *natural discharge locations* that combine within one-quarter-mile downstream (as determined by the shortest flowpath). The examples below illustrate this definition. This term is used to clarify how the thresholds, exemptions, and exceptions of this manual are applied to *project sites* with multiple discharge locations.



Transportation redevelopment project means a stand-alone transportation improvement project that proposes to add, replace, or modify impervious surface, for purposes other than maintenance, within a length of dedicated public or private road right-of-way that has an existing impervious surface coverage of thirty-five percent or more. Road right-of-way improvements required as part of a plat, commercial, industrial, or multifamily project may not be defined as a separate transportation redevelopment project.

1.1 DRAINAGE REVIEW

Drainage review is the evaluation by City of Issaquah staff of a proposed project's compliance with the drainage requirements of this manual. The City of Issaquah department responsible for drainage review is the Public Works Engineering Department (PWE). This section describes when and what type of drainage review is required for a proposed project and how to determine which drainage requirements apply.

In general, drainage review is required for any proposed project (except those proposing only **maintenance**) that is subject to a City of Issaquah **development** permit or approval AND that meets any one of the following conditions:

1. The project adds or will result in 2,000 square feet¹⁰ or more of **new impervious surface, replaced impervious surface**, or **new plus replaced impervious surface** (also termed “new plus replaced impervious surface” in this chapter), OR
2. The project proposes 7,000 square feet¹⁰ or more of **land disturbing activity**, OR
3. The project is a **redevelopment project** proposing \$100,000¹¹ or more of improvements to an existing **high-use site**, OR
4. The project proposes to **construct or modify** a drainage pipe/ditch that is 12 inches or more in size/depth, or receives surface and storm water runoff from a drainage pipe/ditch that is 12 inches or more in size/depth. (Note: If not associated with any of the above three conditions, these projects will be reviewed as part of a Public Works Permit, which is triggered by ditching and utility projects).

If drainage review is required for the proposed project, the type of drainage review must be determined based on project and site characteristics as described below in Section 1.1.1 and clarified in the Core and Special Requirements. The type of drainage review defines the scope of drainage requirements that must be evaluated for compliance with this manual.

1.1.1 DRAINAGE REVIEW TYPES AND REQUIREMENTS

Table 1.1.1.A summarizes the determine drainage review requirements based on project type and size. These requirements are described in detail in the following sections. The thresholds, requirements and exceptions are further defined and explained under the Core Requirements (Section 1.2) and Special Requirements (Section 1.3). The City of Issaquah will determine where a project fits within these drainage review requirements, based on information provided by the applicant.

All engineering plans and calculations must be stamped by a **civil engineer** to demonstrate compliance with these requirements. In some cases, the City may determine that application of these requirements does not require submittal of engineering plans and calculations stamped by a **civil engineer**. For example, if catch basin inserts are proposed to meet oil control requirements, engineered plans and calculations may not be necessary. A plot plan showing catch basin locations may suffice.

¹⁰ The thresholds for **new impervious surface** and **land disturbing activity** shall be applied by **threshold discharge area** and in accordance with the definitions of these surfaces and activities.

¹¹ This is the "project valuation" as declared on the permit application submitted to the City of Issaquah. The dollar amount of this threshold is considered to be as of January 8, 2001 and may be adjusted on an annual basis using the local consumer price index (CPI). Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.

Table 1.1.1.A Drainage Review Requirements Based on Project Type and Size

Project Category (Type and Size)			Core and Special Requirements											Design Standards				
			C1 - Discharge Loc.	C2 - Offsite Analysis	C3 - Flow Control	C4 - Conveyance	C5 - TESC	C6 - M&O	C7 - Financial	C8 - Water Quality	S4 - Source Control	S5 - Oil Control	S6 - Stormwater LID	App C - Small Project	Flow Control (Detention) Standard	Water Quality Treatment Standard ^a		
New and/or Replaced Impervious Surface Area			Land Clearing or New Pervious Surface Area														Pre-Developed Flow Control Condition ^c	Pollution Generating Pervious and Impervious Surfaces
A. Redevelopment Projects: Sites with >35% existing impervious surface area																		
A1. >5000 sf new plus replaced	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x	x		Level 2	Historic	Sensitive Lake	
A2. 2000-5,000 sf new plus replaced	or	7000-35,000 sf	x			x	x					x	x		Appendix C - Small Project ^d	App C - Small Project ^d	App C - Small Project ^d	
A3. <2000 sf new plus replaced	or	<7000 sf ^b					x								(none)	(none)	(none)	
B. New Development Projects: Sites with <35% existing impervious surface area																		
B1. >5000 sf new	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x	x		Level 2	Historic except for exist. imp. surfaces	Sensitive Lake	
B2. 2000-5,000 sf new plus replaced	or	7000-35,000 sf	x			x	x					x	x		Appendix C - Small Project ^d	App C - Small Project ^d	App C - Small Project ^d	
B3. <2000 sf new plus replaced	or	<7000 sf ^b					x								(none)	(none)	(none)	
C. Transportation Redevelopment Projects: Amount of new impervious surface area is <50% of existing impervious surface area																		
C1. >5000 sf new	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x	x		Level 2	Historic except for exist. imp. surfaces	Sensitive Lake	
C2. 2000-5,000 sf new plus replaced	or	7000-35,000 sf	x			x	x					x	x		(none)	(none)	(none)	
C3. <2000 sf new	or	<7000 sf ^d					x								(none)	(none)	(none)	
D. All Sites within Central Issaquah Area Alternative Flow Control Standards Drainage Area																		
D1. >5000 sf new plus replaced	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x	x		Level 2	Existing	Sensitive Lake	
D2. 2000-5,000 sf new plus replaced	or	7000-35,000 sf	x			x	x					x	x		Appendix C - Small Project ^d	App C - Small Project ^d	App C - Small Project ^d	
D3. <2000 sf new plus replaced	or	<7000 sf ^b					x								(none)	(none)	(none)	
E. Redevelopment of High-Use Site: (applicable if not triggered by other requirements)																		
High use sites with >\$100,000 in site improvements							x	x	x			x	x		(as required)	(as required)	(as required)	
F. Master Site Plan Projects: Projects falling under Planning Department Level 5 Review																		
All Master Site Plan projects			Master Drainage Plan (MDP) required															
G. Exceptions to Flow Control and Water Quality Requirements																		
G1. Small Project <1.0 acre total land disturbance: Discharging to Issaquah Valley floor																		
G1.1. >5000 sf new plus replaced	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x	x		Level 1	Existing	Sensitive Lake Redev't. Basic ^e	
G1.2. 2000-10,000 sf new; SFR only	or	7000-35,000 sf	x			x	x					x	x		Appendix C - Small Project ^d	App C - Small Project ^d	App C - Small Project ^d	
G1.3. <5000 sf new	or	<7000 sf ^b					x								(none)	(none)	(none)	

Table 1.1.1.A (Continued)

Project Category (Type and Size)			Core and Special Requirements											Design Standards		
			C1 - Discharge Loc.	C2 - Offsite Analysis	C3 - Flow Control	C4 - Conveyance	C5 - TESC	C6 - M&O	C7 - Financial	C8 - Water Quality	S4 - Source Control	S5 - Oil Control	S6 - Stormwater LID	App C - Small Project	Flow Control (Detention) Standard	Water Quality Treatment Standard
New and/or Replaced Impervious Surface Area	or	Land Clearing or New Pervious Surface Area												Flow Control	Pre-Developed Condition	Pollution Generating Pervious and Impervious Surfaces
G2. Small Project <1.0 acre total land disturbance: Discharging to hillside streams																
G2.1. >5000 sf new plus replaced	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x		Level 2	Existing	Sensitive Lake Redev't. Basic ^e
G2.2. 2000-10,000 sf new; SFR only	or	7000-35,000 sf	x			x	x				x	x	x	Appendix C - Small Project ^d (none)		App C - Small Project ^d (none)
G2.3. <5000 sf new	or	<7000 sf ^b					x									
G3. Project Cost: Value of improvements is <50% of existing improvements (Redevelopment projects only)																
G3.1. >5000 sf new	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x		Level 2	Historic except for exist. imp. surfaces	Sensitive Lake
G3.2. 2000-5000 sf new plus replaced	or	7000-35,000 sf	x			x	x				x	x	x	Appendix C - Small Project ^d (none)		App C - Small Project ^d (none)
G3.3. <2000 sf new plus replaced	or	<7000 sf ^b					x									
G4. Detention Facility Cost: The size of a detention facility can be reduced if it costs more than 1/3 value of site improvements or twice the cost of the facility if it were built on an undeveloped site																
G4.1. >5000 sf new	or	>35,000 sf	x	x	x	x	x	x	x	x	x	x		Calculated	Historic	Sensitive Lake
G4.2. 2000-5000 sf new plus replaced	or	7000-35,000 sf	x			x	x				x	x	x	Appendix C - Small Project ^d (none)		App C - Small Project ^d (none)
G4.3. <2000 sf new plus replaced	or	<7000 sf ^b					x									
G5. Direct Discharge to Lake Sammamish																
Projects discharging to lake through artificial conveyance			Same as above, except no detention required; see Sec. 1.2.3.1													
G6. Stormwater Low Impact Development																
All qualifying projects			Same as above, except that use of Low Impact Development can result in up to 50% reduction in required detention volume; see Sec. 5.2.2													

^a Sensitive Lake WQ menu for water quality treatment of new and replaced pollution generating surfaces is required in all projects, except for infiltration where a lower level of treatment may be allowed. The Enhanced Basic WQ menu may also apply for non-SFR projects, and Basic Treatment may apply for redevelopment projects under 1 acre.

^b TESC for clearing areas smaller than 7000 sf is required by IMC 16.30, Erosion and Sediment Control.

^c Pre-developed conditions: "Historic" means forested for entire project site (flow control required for new and replaced impervious surfaces, and converted pervious surfaces); "Historic except for existing impervious surfaces" is same as "Historic" except flow control for replaced impervious surfaces is not required; "Existing" means 1979 site conditions.

^d Appendix C - Small Project Drainage Requirements apply to single family residential projects only.

^e Water quality treatment is required for all contiguous new plus replaced PGIS.

Note: This summary may not identify all requirements. Refer to Core and Special Requirements for all requirements and allowable exemptions.

1.1.2 REDEVELOPMENT PROJECTS: SITES WITH >35% EXISTING IMPERVIOUS SURFACE AREA

(Table 1.1.1.A, Category A1)

Projects that fall under the definition for “Redevelopment” include sites where existing impervious surfaces cover 35% or more of the site. This determination will be based on mapping provided by the applicant, as verified by aerial photographs or by the most recent approved site plan if drainage review occurred previously for the site. Existing impervious surface area is based on 1979 conditions plus any additional impervious surfaces created by subsequent permitted or permit-exempt activities (see definition of “existing site conditions”).

Thresholds

Drainage Review is required for projects meeting one or more of the following criteria:

- The project will result in 2,000 square feet or more of *new impervious surface, replaced impervious surface, or new plus replaced impervious surface* (“new plus replaced impervious surface”), or
- The project will result in 7,000 square feet or more of land disturbing activity.

Requirements

Sites meeting the definition of “Redevelopment Sites” are subject to the following requirements:

- Core Requirements and Special Requirements per Table 1.1.1.A
- Projects proposing between 2,000 and 5,000 sq. ft. of new plus replaced impervious surface may follow the “Small Project Drainage Requirements” (Appendix C).
- Projects proposing more than 5,000 sq. ft. of new plus replaced impervious surface shall follow “Level 2” (Conservation) flow control assuming a **historic pre-developed condition**. Target surfaces typically include all new impervious surfaces and replaced impervious surfaces. Target surfaces do not include existing impervious and pervious surfaces within the parcel that are not disturbed by project activities, and thus do not require flow control. See Core Requirement #3 for clarification and details.
- Water quality treatment shall be provided for pollution generating impervious surfaces (PGIS) and pollution generating pervious surfaces (PGPS), meeting the Lake Protection treatment standard. See Core Requirement #8 for clarification and details.
- Stormwater Low Impact Development may be required depending on location in the City. See Special Requirement #6 for clarification and details.

1.1.3 NEW DEVELOPMENT PROJECTS: SITES WITH <35% EXISTING IMPERVIOUS SURFACE AREA

(Table 1.1.1.A, Category A2)

Projects that fall under the definition for “New Development” include sites where existing impervious surfaces cover less than 35% of the site. This determination will be based on mapping provided by the applicant, as verified by aerial photographs or actual measurements. Existing impervious surface area is based on 1979 conditions plus any additional impervious surfaces created by subsequent permitted or permit-exempt activities (see definition of “existing site conditions”).

Thresholds

Drainage Review is required for projects meeting one or more of the following criteria:

- The project will result in 2,000 square feet or more of ***new impervious surface***, or
- The project will result in 7,000 square feet or more of land disturbing activity.

Requirements

Sites meeting the definition of “New Development” sites are subject to the following requirements (the difference from the “Redevelopment” requirements is shown in bold):

- Core Requirements and Special Requirements per Table 1.1.1.A
- Projects proposing between 2,000 and 5,000 sq. ft. of new plus replaced impervious surface may follow the “Small Project Drainage Requirements” (Appendix C).
- Projects proposing more than 5,000 sq. ft. of new impervious surface shall follow “Level 2” (Conservation) flow control assuming **historic except for existing impervious surface pre-developed condition**. That is, assume *historic site conditions* as the predeveloped condition for all targeted surfaces except flow control for replaced impervious surfaces is not required. Target surfaces do not include existing impervious or pervious surfaces within the parcel that are not disturbed by project activities, and thus do not require flow control. See Core Requirement #3 for clarification and details.
- Water quality treatment shall be provided for pollution generating impervious surfaces (PGIS) and pollution generating pervious surfaces (PGPS), meeting the Lake Protection treatment standard. See Core Requirement #8 for clarification and details.
- Stormwater Low Impact Development may be required depending on location in the City. See Special Requirement #6 for clarification and details. Core Requirements and Special Requirements per Table 1.1.1.A

1.1.4 TRANSPORTATION REDEVELOPMENT PROJECTS

(Table 1.1.1.A, Category C)

Transportation redevelopment sites are defined as roads located in public or private right-of-ways and where existing impervious surfaces cover 35% or more of the site. This exception to the redevelopment requirements applies if the amount of new impervious surface is less than 50% of the existing impervious surfaces within the project limits. This exception exempts replaced impervious surfaces from the flow control requirement (i.e., pre-developed conditions are based on existing site conditions). Flow control is still required for all new impervious and pervious surfaces.

Note: Projects located within the Central Issaquah Area Alternative Flow Control Standards Drainage Area can also assume flow control is based on **existing pre-developed conditions** as specified in Section 1.1.5.

Changes to Criteria

Changes from the Redevelopment requirements under this exception are summarized as follows:

- Core Requirements and Special Requirements per Table 1.1.1.A
- Projects proposing between 2,000 and 5,000 sq. ft. of new plus replaced impervious surface may follow the “Small Project Drainage Requirements” (Appendix C).
- Projects proposing more than 5,000 sq. ft. of new impervious surface shall follow “Level 2” (Conservation) flow control assuming **historic except for existing impervious surface pre-developed condition**. That is, assume *historic site conditions* as the predeveloped condition for all targeted surfaces except flow control for replaced

impervious surfaces is not required. Target surfaces do not include existing impervious or pervious surfaces within the parcel that are not disturbed by project activities, and thus do not require flow control. See Core Requirement #3 for clarification and details.

- Water quality treatment shall be provided for pollution generating impervious surfaces (PGIS) and pollution generating pervious surfaces (PGPS), meeting the Lake Protection treatment standard. See Core Requirement #8 for clarification and details.
- Stormwater Low Impact Development may be required depending on location in the City. See Special Requirement #6 for clarification and details. Core Requirements and Special Requirements per Table 1.1.1.A

1.1.5 ALL SITES WITHIN CENTRAL ISSAQUAH AREA ALTERNATIVE FLOW CONTROL STANDARDS DRAINAGE AREA

(Table 1.1.1.A, Category D)

Projects located within the Central Issaquah Area Alternative Flow Control Standards Drainage Area, regardless of existing impervious surface percentage, shall assume flow control based on **existing pre-developed conditions**. Projects must be located within the defined drainage basins shown in the Central Issaquah Area Alternative Flow Control Standards Drainage Area Map (Figure 1.1.5.A), as further delineated from mapping provided by the applicant and verified by City utility mapping or by the most recent approved site plan if drainage review occurred previously for the site. Existing impervious surface area is based on 1979 conditions plus any additional impervious surfaces created by subsequent permitted or permit-exempt activities (see definition of “existing site conditions”).

Thresholds

Drainage Review is required for projects meeting one or more of the following criteria:

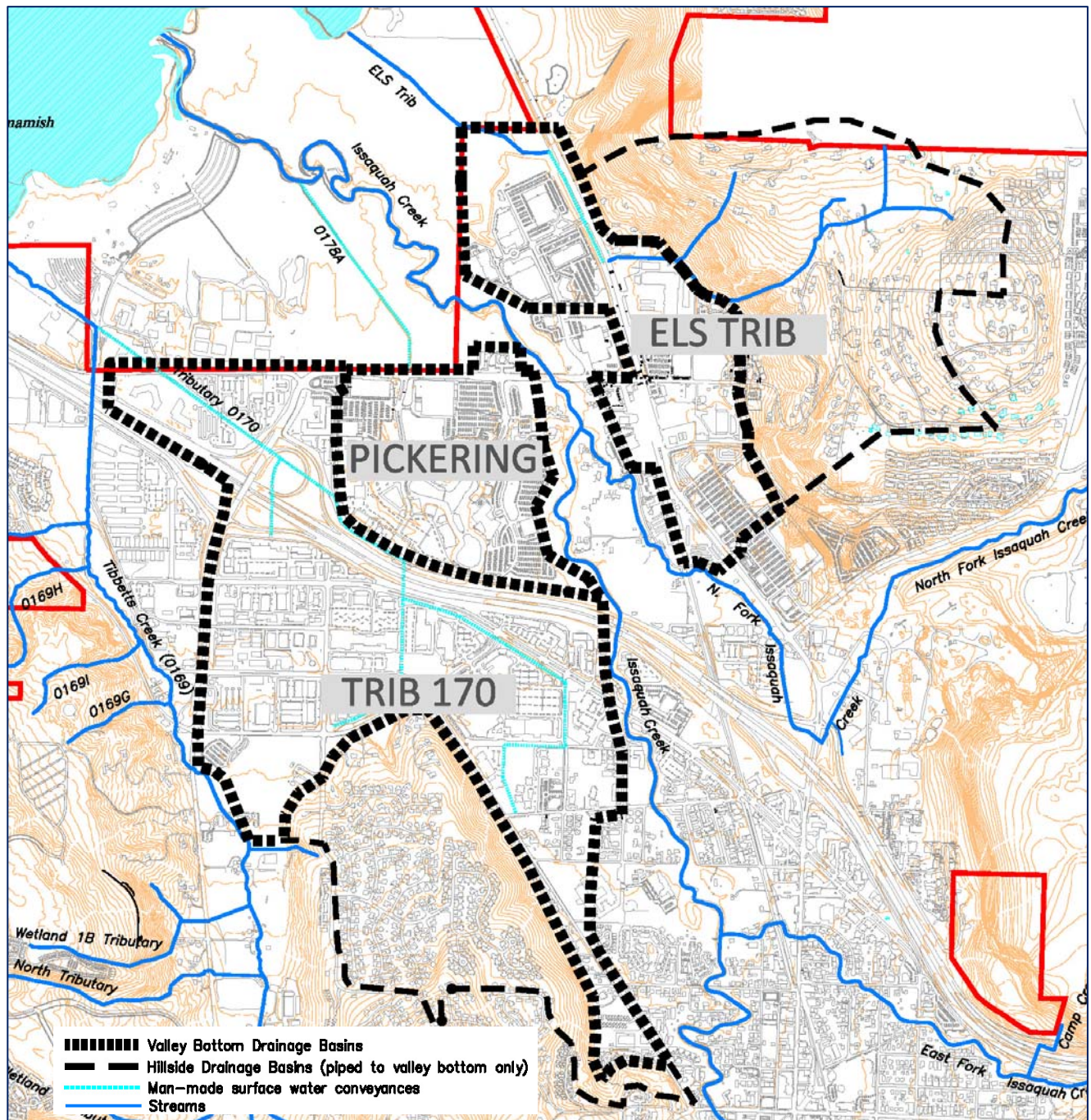
- The project will result in 2,000 square feet or more of *new impervious surface, replaced impervious surface, or new plus replaced impervious surface* (“*new plus replaced impervious surface*”), or
- The project will result in 7,000 square feet or more of land disturbing activity.

Requirements

Sites meeting the definition of “Redevelopment Sites” are subject to the following requirements:

- Core Requirements and Special Requirements per Table 1.1.1.A
- Projects proposing between 2,000 and 5,000 sq. ft. of new plus replaced impervious surface may follow the “Small Project Drainage Requirements” (Appendix C).
- Projects proposing more than 5,000 sq. ft. of new plus replaced impervious surface shall follow “Level 2” (Conservation) flow control assuming **existing pre-developed conditions**. Target surfaces typically include all new impervious surfaces and replaced impervious surfaces. Target surfaces do not include existing impervious and pervious surfaces within the parcel that are not disturbed by project activities, and thus do not require flow control. See Core Requirement #3 for clarification and details.
- Water quality treatment shall be provided for pollution generating impervious surfaces (PGIS) and pollution generating pervious surfaces (PGPS), meeting the Lake Protection treatment standard. See Core Requirement #8 for clarification and details.
- Stormwater Low Impact Development may be required depending on location in the City. See Special Requirement #6 for clarification and details.

**FIGURE 1.1.5.A CENTRAL ISSAQUAH AREA ALTERNATIVE FLOW CONTROL STANDARDS
DRAINAGE AREA MAP**



Map Notes:

- 1) Locations of streams, stormwater systems, and drainage basins on this map are approximate. Determinations of whether a site is within one of these three basins - Tributary 170, Pickering, or ELs Tributary - shall be made on detailed site data included in permit applications and approved by the City.
- 2) Alternative flow control standards apply only to stormwater discharges to valley bottom drainages and to piped stormwater systems that convey stormwater from hillsides to those valley bottom drainages.

1.1.6 REDEVELOPMENT OF HIGH-USE SITES

(Table 1.1.1.A, Category E)

This category addresses improvements to water quality by applying source control and oil control requirements to **redevelopment projects** located on the most intensively used **sites** developed prior to current water quality requirements. These are referred to as **high-use sites**. This requirement addresses redevelopment projects that fail to trigger other thresholds for new or replaced impervious surface. If a significant quantity of new plus replaced impervious surfaces is involved, these projects may also be subject to new development and redevelopment requirements in Sections 1.1.2 and 1.1.3, above.

Thresholds

Drainage Review of redeveloped high-use sites is required for projects meeting one or more of the following criteria:

- The project is a high-use site proposing \$100,000 or more of improvements.

Requirements

Requirements for high use sites include the following:

- Source Control (Special Requirement #4), and
- Oil Control (Special Requirement #5).

1.1.7 MASTER SITE PLAN PROJECTS

(Table 1.1.1.A, Category F)

Master Site Plan projects include large projects that fall under ASDP Level 5 review. See the Land Use Code (IMC 18.04) for Administrative Site Development Permit levels of review. The level of ASDP review will be determined by Planning Department during the pre-application process.

Master Site Plan projects will be required to prepare a Master Drainage Plan, consistent with guidelines contained in *Master Drainage Planning for Large or Complex Site Development* (King County). Projects are required to meet all core and special requirements in Sections 1.2 and 1.3.

Note: Projects located within the Central Issaquah Area Alternative Flow Control Standards Drainage Area can also assume flow control is based on **existing pre-developed conditions** as specified in Section 1.1.5.

1.1.8 EXCEPTIONS TO FLOW CONTROL AND WATER QUALITY REQUIREMENTS

The following exceptions to the flow control and pre-development condition criteria are allowed depending on project type, size, cost, and location.

1.1.8.1 SMALL PROJECT <1.0 ACRE TOTAL LAND DISTURBANCE: DISCHARGING TO ISSAQUAH VALLEY FLOOR

(Table 1.1.1.A, Category G1)

Small projects involving a total site disturbance of less than 1.0 acre and that discharge to streams located on the Issaquah Valley floor can obtain a flow control and pre-developed conditions exception. These projects

must not be part of a larger common plan of development or sale, and stormwater must discharge to low-gradient open channels and streams physically located on the Issaquah Valley floor. Projects located above the valley floor but have all stormwater tight-lined to an outfall located on the valley floor also meet this definition. The exact location of the boundary between the valley floor and the adjacent hillside will be made by City staff based on available topographic information and site visits. The intent is for stormwater to discharge to open channels and streams that are not susceptible to erosion and scour. In addition to allowing Level 1 flow control at these sites, this exception exempts replaced impervious surfaces from the flow control requirement (i.e., pre-developed conditions are based on existing site conditions). Flow control is still required for all new impervious and pervious surfaces.

Changes to Criteria

Changes from the Redevelopment and Development requirements under this exception are summarized as follows:

- The threshold for Drainage Review is based on 2000 sq. ft. of new impervious surface area.
- Projects proposing more than 5,000 sq. ft. of new impervious surface shall follow “Level 1” (Basic Flow Control), assuming existing pre-developed condition. See Core Requirement #3 for clarification and details.
- For water quality treatment, projects proposing more than 5,000 sq ft of new plus replaced PGIS shall meet Sensitive Lake treatment standards. Redevelopment projects can follow the Basic Menu for water quality treatment. Redevelopment projects are exempt from water quality treatment if the new PGIS is <5000 sf and the project value is <\$500,000.

The intent of this exception is to follow the requirements contained in the 1998 King County Surface Water Design Manual. Please refer to that document for specific Core and Special Requirements and associated guidance. Subsequent design manuals may also be used for approved design guidance (example: approved water quality treatment devices).

1.1.8.2 SMALL PROJECT <1.0 ACRE TOTAL LAND DISTURBANCE: DISCHARGING TO HILLSIDE STREAMS

(Table 1.1.1.A, Category G2)

Small projects involving a total site disturbance of less than 1.0 acre and that discharges to hillside streams located above the Issaquah Valley floor can obtain a pre-developed conditions exception. These projects must not be part of a larger common plan of development or sale, and stormwater discharges to open channels and streams physically located on a hillside above the Issaquah Valley floor. These open channels and streams are susceptible to erosion and scour, necessitating a higher flow control standard for stormwater generated by new impervious surfaces. This exception exempts replaced impervious surfaces from the flow control requirement (i.e., pre-developed conditions are based on existing site conditions). Flow control is still required for all new impervious and pervious surfaces.

Changes to Criteria

Changes from the Redevelopment and Development requirements under this exception are summarized as follows:

- The threshold for Drainage Review is based on 2000 sq. ft. of new impervious surface area.
- Projects proposing more than 5,000 sq. ft. of new impervious surface shall follow “Level 2” (Conservation Flow Control), assuming existing pre-developed condition. See Core Requirement #3 for clarification and details.

- For water quality treatment, projects proposing more than 5,000 sq ft of new plus replaced PGIS shall meet Sensitive Lake treatment standards. Redevelopment projects can follow the Basic Menu for water quality treatment. Redevelopment projects are exempt from water quality treatment if the new PGIS is <5000 sf and the project value is <\$500,000.

The intent of this exception is to follow the requirements contained in the 1998 King County Surface Water Design Manual. Please refer to that document for specific Core and Special Requirements and associated guidance. Subsequent design manuals may also be used for approved design guidance (example: approved water quality treatment devices).

1.1.8.3 PROJECT COST

(Table 1.1.1.A, Category G3)

Redevelopment projects involving non-substantial site improvements can obtain a cost exception. To qualify, the value of improvements associated with the site development, including interior improvements, is less than 50% of the assessed value of the existing site improvements. This exception exempts replaced impervious surfaces from the flow control requirement (i.e., pre-developed conditions are based on existing site conditions). Flow control is still required for all new impervious and pervious surfaces.

Changes to Criteria

Changes from the Redevelopment and Development requirements under this exception are summarized as follows:

- Flow control shall be “Level 2” (Conservation Flow Control), assuming existing pre-developed condition. See Core Requirement #3 for clarification and details.

1.1.8.4 FLOW CONTROL FACILITY COST

(Table 1.1.1.A, Category G4)

Projects that require a costly stormwater management facility to meet the flow control requirement for replaced impervious surfaces can obtain a cost exception. The facility requirement in Conservation Flow Control Areas as it pertains to the requirement for mitigating replaced impervious surfaces only may be reduced using the adjustment process if the following two conditions are met:

- The cost of the project’s flow control facilities to mitigate all target surfaces (including *new* and *replaced impervious surfaces*) exceeds that necessary to mitigate just the *new impervious surface* plus *new pervious surface*, and
- The cost of the project’s flow control facilities to mitigate all target surfaces must also exceed 1/3 of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new *development site*, whichever is less.

The amount of allowed flow control facility reduction is determined as follows:

- At a minimum, the project’s flow control facilities must mitigate *new impervious surfaces* plus *new pervious surfaces* regardless of cost, and
- If the cost of mitigating *replaced impervious surfaces* (in addition to *new impervious surfaces* plus *new pervious surfaces*) results in a total detention facility cost that is greater than 1/3 of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new *development site* (whichever is less), then the facility size can be reduced to those upper cost limits. Facility reduction is achieved by incrementally increasing the amount of impervious surface area under the pre-developed condition, to the point where the upper cost limits are achieved.

Changes to Criteria

Changes from the Redevelopment and Development requirements under this exception are summarized as follows:

- Flow control shall be “Level 2” (Conservation Flow Control), with the pre-developed condition defined by a cost analysis. The resulting pre-developed condition (i.e., amount of impervious surface area) will be somewhere between “forested” and “current” conditions, based on the storm facility cost equaling the valuation criteria described above.

1.1.8.5 DIRECT DISCHARGE TO LAKE SAMMAMISH

(Table 1.1.1.A, Category G5)

Flow control can be eliminated entirely if the project discharges directly to Lake Sammamish via a non-stream conveyance. The conveyance system shall be capable of conveying the 25-year peak flow rate, with capacity available for current and future development within the drainage basin served by the storm line. See Section 1.2.3.1 for additional information on how to apply this exemption.

1.1.8.6 LOW IMPACT DEVELOPMENT PROJECTS

(Table 1.1.1.A, Category G6)

Use of Low Impact Development (LID) can result in up to 50% reduction in required detention volumes, and can provide water quality treatment benefits as well. See Section 5.2.2 for additional information on how to apply this exemption. LID is required in certain areas of the City as specified in Special Requirement #6 (Section 1.3.6).

1.1.9 RETROFIT PROJECTS

In retrofit situations where the requirements of this Surface Water Design Manual and IMC 13.28 are not triggered, use of Ecology-approved emerging technology BMPs for water quality treatment are encouraged, but not required. New technologies for water quality treatment that are not yet approved by Ecology may be used with prior approval by the City. The request should include information that the proposed treatment device is effective in reducing pollutants from stormwater. The applicant, however, should recognize that subsequent redevelopment that triggers the water quality treatment requirements herein may require modification or replacement of the installed BMP with an Ecology-approved BMP.

1.1.10 DIFFERENCES FROM KING COUNTY MANUAL

Table 1.1.10A summarizes City of Issaquah-specific differences from the King County Surface Water Design Manual to reflect design standards and standard details approved by the Public Works Engineering Department as well as other City-specific requirements. Tables 1.1.9B and 1.1.9C summarizes available water treatment facility options based on current Ecology approvals as allowed in the King County, Ecology, and Washington State Department of Transportation (WSDOT) stormwater technical guidance manuals. All future Ecology approvals for emerging stormwater treatment technologies will also be approved by the City.

TABLE 1.1.10A SPECIFIC REQUIREMENTS APPLICABLE TO THE CITY OF ISSAQUAH

Subject	Requirement
GENERAL	
Standard specifications	The City of Issaquah adopts the most recent WSDOT Standard Specifications for Road, Bridge, and Municipal Construction.
Standard details	City of Issaquah Standard Details for drainage structures, utility trenching, pavement restoration, etc., shall be followed. These are available from the Public Works Engineering Department.
Materials	Materials are approved in accordance with the City of Issaquah Street Standards. These documents are available at the Public Works Engineering office.
HYDROLOGIC ANALYSIS	
Hydrologic modeling	The Department of Ecology's Western Washington Hydrology Model (WWHM) is approved for use in Issaquah, in addition to KCRTS.
WATER QUALITY	
Treatment facilities	Permission from Public Works Operations Department is required for sand filters in tracts or rights of way to be dedicated to the City for operation and maintenance.
Pollution Prevention Manual	In addition to the 2009 King County Stormwater Pollution Prevention Manual, the City also adopts Volume IV of the 2005 Department of Ecology Stormwater Management Manual for Western Washington. If a pollution generating activity is not covered by these manuals and is contributing to a prohibited discharge, the City may require best management practices from other guidance documents.
Treatment facilities allowed	Treatment facilities identified in other Ecology-approved technical manuals are approved for use in the City. See Tables 1.1.9B and 1.1.9C for current list of available facility options (these tables will be updated and posted on the City's web site as new technologies are approved by Ecology). Use of treatment methods not approved by Ecology must follow the adjustment process on a case-by-case basis.
LOW IMPACT DEVELOPMENT (LID)	
LID Flow Control Requirements	Flow Control BMP requirements contained in Sections 1.2.3.3 and 5.2 are replaced with stormwater Low Impact Development Special Requirement #6. Projects located within mapped areas of moderate to high soil infiltration must include LID in their site design, unless shown to be infeasible. If soils are suitable for infiltration, then projects must infiltrate stormwater to the extent feasible.

TABLE 1.1.10B SINGLE FACILITY TREATMENT OPTIONS

Facility Option	Design Guidance ^a	Pre-Treatment	Basic	Enhanced Basic	Sensitive Lake Protection
1. Biofiltration swale	KC,DOE		Approved		
2. Bio-infiltration swale	DOE		Approved		
3. Filter strip	KC,DOE		Approved		
4. Compost amended filter strip	DOE			Approved	
5. Wetpond	KC,DOE	Approved	Approved		
6. Large wetpond	KC		Approved	Approved	Approved
7. Wetvault	KC,DOE	Approved	Approved		
8. Stormwater wetland	KC,DOE		Approved	Approved	
9. Combined detention and wetpool	KC,DOE		Approved		
10. Sand filter	KC,DOE		Approved		
11. Amended sand filter	DOE		Approved	Approved	
12. Large sand filter	KC,DOE		Conditional ^b	Conditional ^b	Conditional ^b
13. Infiltration treatment (ponds)	KC,DOE		Approved ^c	Approved ^c	Approved ^c
14. Bioretention/rain garden	DOE		Approved ^c	Approved ^c	Approved ^c
15. Pervious pavement	KC,DOE		Approved ^c	Approved ^c	Approved ^c
16. WSDOT Media Filter Drain	TAPE		GULD	GULD	GULD
17. Aqua-Swirl Concentrator	TAPE	GULD			
18. CDS Stormwater Treatment	TAPE	GULD			
19. Vortechs System	TAPE	GULD			
20. Downstream Defender	TAPE	GULD			
21. Stormceptor	TAPE	GULD			
22. BaySeparator	TAPE	CULD			
23. V2B1 Treatment System	TAPE	PULD			
24. CDS Media Filtration System	TAPE		GULD		
25. Stormfilter w/ZPG media	TAPE		GULD		
26. Filterra	TAPE		ULD	GULD	CULD
27. Aqua-Filter System	TAPE		PULD	PULD	PULD
28. EcoStorm Plus	TAPE		PULD		
29. Kristar FloGard Perk Filter	TAPE		GULD		GULD
30. BayFilter	TAPE		CULD	CULD	CULD
31. Up-Flo Filter	TAPE		PULD		
32. JellyFish Filter	TAPE		PULD		
33. Linear Modular Wetland	TAPE		CULD	PULD	
34. StormwaterRx Aquip	TAPE		CULD	CULD	CULD
35. UrbanGreen BioFilter	TAPE		CULD	CULD	

Note: Updates issued by King County and Ecology will amend this table as appropriate.

^a Manual for technical guidance: KC – King County; DOE – Ecology; TAPE – Ecology emerging technology. See Ecology’s website for definitions of GULD, CULD, and PULD; CITY – City of Issaquah

^b Pretreatment or Basic Treatment required prior to infiltration through sand filter. Pre-approval of sand filters that will be dedicated to the City of Issaquah for maintenance is required.

^c Infiltration of 91% of runoff volume for the treated area is required to obtain full treatment credit, with either basic treatment or infiltration through soils that meet soil treatment exemption on Page 1-61.

TABLE 1.1.10C TREATMENT TRAIN FACILITY OPTIONS

First Basic Facility	Second Facility	Design Guidance^a	Enhanced Basic	Sensitive Lake Protection
1. Biofiltration swale	Sand filter, sand filter vault, or Stormfilter w/CSF	KC, DOE	Approved	
2. Biofiltration swale	Sand filter, or sand filter vault	KC, DOE	Approved	Approved
3. Filter strip	Linear sand filter (no presettling cell needed)	KC, DOE	Approved	Approved
4. Linear sand filter	Filter strip	KC, DOE	Approved	Approved
5. Wetpond	Sand filter, sand filter vault, or Stormfilter w/CSF	KC, DOE	Approved	
6. Wetpond	Sand filter, or sand filter vault	KC, DOE	Approved	Approved
7. Wetvault	Sand filter, sand filter vault, or Stormfilter w/CSF	KC, DOE	Approved	
8. Wetvault	Sand filter or sand filter vault	KC, DOE	Approved	Approved
9. Stormwater wetland	Sand filter or sand filter vault	KC, DOE		Approved
10. Combined detention/wetpool	Sand filter, sand filter vault, or Stormfilter w/CSF	KC, DOE	Approved	
11. Combined detention/wetpool	Sand filter or sand filter vault	KC, DOE	Approved	Approved
12. Sand filter or sand filter vault (presettling cell required if not preceded by detention)	Stormfilter w/CSF	KC, DOE	Approved	
13. Stormfilter w/ZPG media	Sand filter, sand filter vault	KC	Approved	Approved
14. Stormfilter w/ZPG media	Sand filter, sand filter vault, or Stormfilter w/CSF	KC	Approved	

Note: Updates issued by King County and Ecology will amend this table as appropriate.

^a Design manuals for technical guidance:

KC – King County

DOE – Ecology

1.1.11 OTHER REQUIREMENTS AFFECTING DRAINAGE DESIGN

Table 1.1.11 summarizes other requirements that typically affect development site and drainage design. Other code requirements not identified may also apply, and will be identified during the pre-application process and subsequent permit review. The engineer/architect should become familiar with these and other requirements and incorporate them into their drainage design as necessary. Questions regarding these requirements shall be directed to the Department listed in the table.

TABLE 1.1.11 OTHER REQUIREMENTS AFFECTING DRAINAGE DESIGN		
Subject	Requirement	Reference
City of Issaquah Planning Department		
Impervious Surface Limits	Limits on site impervious surface area per Land Use Code	IMC18.07.360 (District Standards Table)
Landscape Code	Soil porosity and amendments in landscaping	IMC 18.12.140(P) and (Q)
Landscape Code	No impervious surfaces within the area defined by the drip line of any trees to be retained.	IMC 18.12.140(N)(4)(c)
Critical Areas and Associated Buffers	Allowable uses, including stormwater facilities, in stream and wetland buffers	IMC 18.10.610 (wetlands) IMC 18.10.775 (streams)
Shorelines	Allowable uses, including stormwater facilities, in Shoreline buffer	IMC 18.10.940 (adopted Shoreline Plan)
Transfer of Development Rights (TDR) Program	Reduction in impervious surface areas along stream corridors (sending sites), in exchange for greater density in growth areas (receiving sites)	IMC 18.10.2050(A)(3)
Transfer of Development Rights (TDR) Program	Additional impervious surface area credit for using LID at receiving sites located in the CARA	IMC 18.10.2040(A)(3)(c)
City of Issaquah Public Works Engineering Department		
Flood Hazard Code	Development within designated areas of special flood hazard, including no net fill and no blockage of floodwaters.	IMC 16.36
Critical Aquifer Recharge Area (CARA code)	Hazardous waste management requirements within wellhead protection areas (CARA Class 1 and 2)	IMC 18.10.796 and IMC 13.29
State Department of Ecology		
Underground Injection Control (UIC)	Stormwater infiltration facilities meeting the definition of a UIC well must be registered with Ecology and meet Ecology treatment criteria.	Department of Ecology
NPDES Construction Stormwater Permit	Construction sites over 1.0 acre must obtain Department of Ecology construction stormwater general permit	Department of Ecology

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1.2 CORE REQUIREMENTS

This section details the following eight core requirements:

- "Core Requirement #1: Discharge at the Natural Location," Section 1.2.1
- "Core Requirement #2: Offsite Analysis," Section 1.2.2 (p. 1-25)
- "Core Requirement #3: Flow Control," Section 1.2.3 (p. 1-31)
- "Core Requirement #4: Conveyance System," Section 1.2.4 (p. 1-46)
- "Core Requirement #5: Erosion and Sediment Control," Section 1.2.5 (p. 1-52)
- "Core Requirement #6: Maintenance and Operations," Section 1.2.6 (p. 1-58)
- "Core Requirement #7: Financial Guarantees and Liability," Section 1.2.7 (p. 1-60)
- "Core Requirement #8: Water Quality," Section 1.2.8 (p. 1-61).

1.2.1 CORE REQUIREMENT #1: DISCHARGE AT THE NATURAL LOCATION

All surface and storm water runoff from a project must be discharged at the natural location so as not to be diverted onto or away from downstream properties. The manner in which runoff is discharged from the **project site** must not create a significant adverse impact to downhill properties or drainage systems (see "Discharge Requirements" below). *Note: Projects that do not discharge all **project site** runoff at the natural location will require an approved adjustment of this requirement (see Section 1.4). The City of Issaquah may waive this adjustment, however, for projects in which only a small portion of the **project site** does not discharge runoff at the natural location and the runoff from that portion is unconcentrated and poses no significant adverse impact to downstream properties.*

Intent: To prevent adverse impacts to downstream properties caused by diversion of flow from one flowpath to another, and to discharge in a manner that does not significantly impact downhill properties or drainage systems. Diversions can cause greater impacts (from greater runoff volumes) than would otherwise occur from new development discharging runoff at the natural location. Diversions can also impact properties that rely on runoff water to replenish wells and ornamental or fish ponds.

❑ DISCHARGE REQUIREMENTS

Proposed projects must comply with the following discharge requirements (1, 2, and 3) as applicable:

1. Where no conveyance system exists at the abutting downstream property line and the natural (existing) discharge is unconcentrated, any runoff concentrated by the proposed project must be discharged as follows:
 - a) IF the 100-year peak discharge¹² is less than or equal to 0.2 cfs under existing conditions and will remain less than or equal to 0.2 cfs under developed conditions, THEN the concentrated runoff may be discharged onto a rock pad or to any other system that serves to disperse flows.
 - b) IF the 100-year peak discharge is less than or equal to 0.5 cfs under existing conditions and will remain less than or equal to 0.5 cfs under developed conditions, THEN the concentrated runoff may be discharged through a dispersal trench or other dispersal system provided the applicant can demonstrate that there will be no significant adverse impact to downhill properties or drainage systems.

¹² Peak discharges for applying this requirement are determined using KCRS or WWHM with 15-minute time steps as detailed in Chapter 3.

- c) IF the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, or if a significant adverse impact to downhill properties or drainage systems is likely, THEN a conveyance system must be provided to convey the concentrated runoff across the downstream properties to an acceptable discharge point.¹³ Drainage easements for this conveyance system must be secured from downstream property owners and recorded prior to engineering plan approval.
- 2. IF a proposed project, or any ***natural discharge area*** within a project, is located within a ***Landslide Hazard Drainage Area*** and drains over the erodible soils of a ***landslide hazard area*** with slopes steeper than 15%, THEN a **tightline system must be provided** through the ***landslide hazard area*** to an acceptable discharge point unless one of the following exceptions applies. The tightline system must comply with the design requirements in Core Requirement #4 and in Section 4.2.2 unless otherwise approved by the City of Issaquah. Drainage easements for this system must be secured from downstream property owners and recorded prior to engineering plan approval. *Note: Core Requirement #4 requires tightlining of drainage systems on slopes of 15% or greater.*

Exceptions: A tightline is not required for any ***natural discharge location*** where one of the following conditions can be met:

 - a) Less than 2,000 square feet of ***new impervious surface*** will be added within the ***natural discharge area***, OR
 - b) The developed conditions runoff from the ***natural discharge area*** is less than 0.1 cfs for the 100-year runoff event and will be infiltrated for runoff events up to and including the 100-year event, OR
 - c) The *developed conditions runoff volume*¹⁴ from the ***natural discharge area*** is less than 50% of the existing conditions runoff volume from other areas draining to the location where runoff from the ***natural discharge area*** enters the ***landslide hazard area*** onto slopes steeper than 15%, AND the provisions of Discharge Requirement 1 are met, OR
 - d) The City of Issaquah determines that a tightline system is not physically feasible or will create a significant adverse impact based on a soils report by a geotechnical engineer.
- 3. For projects adjacent to or containing a ***landslide, steep slope, or erosion hazard area*** as defined in IMC 18.10, the applicant must demonstrate that onsite drainage facilities and/or flow control BMPs will not create a significant adverse impact to downhill properties or drainage systems. The City may require tightlining of stormwater discharges through these areas, or additional flow control mitigation (e.g, up to Level 3).

¹³ *Acceptable discharge point* means an enclosed drainage system (i.e., pipe system, culvert, or tightline) or open drainage feature (e.g., ditch, channel, swale, stream, river, pond, lake, or wetland) where concentrated runoff can be discharged without creating a significant adverse impact.

¹⁴ For the purposes of applying this exception, the *developed conditions runoff volume* is the average annual runoff volume as computed per Chapter 3. Any areas assumed not to be cleared when computing the developed conditions runoff volume must be set aside in an open space tract or covenant in order for the proposed project to qualify for this exception. Preservation of existing forested areas in Landslide Hazard Drainage Areas is encouraged.

1.2.2 CORE REQUIREMENT #2: OFFSITE ANALYSIS

All proposed projects must submit an offsite analysis report that assesses potential offsite drainage impacts associated with development of the **project site** and proposes appropriate mitigation of those impacts. The initial permit submittal shall include, at minimum, a **Level 1 downstream analysis** as described in Section 1.2.2.1 below. If impacts are identified, the proposed projects shall meet any applicable problem-specific requirements for mitigation of impacts specified in Section 1.2.2.2 (p. 1-28).

Intent: To identify and evaluate offsite flooding and erosion problems that may be created or aggravated by the proposed project, and to ensure appropriate measures are provided for preventing creation or aggravation of those problems. In addition, this requirement is intended to ensure appropriate provisions are made, as needed, to mitigate other identified impacts associated with the quantity of surface and storm water runoff from the **project site** (e.g., impacts to the hydrology of a wetland as may be identified by a "critical area report" per IMC 18.10).

The primary component of an offsite analysis report is the **downstream analysis**, which examines the drainage system within one-quarter mile downstream of the **project site** or farther as described in Section 1.2.2.1 below. It is intended to identify existing or potential/predictable downstream flooding and erosion problems so that appropriate mitigation, as specified in Section 1.2.2.2 (p. 1-28), can be provided to prevent aggravation of these problems. A secondary component of the offsite analysis report is an **evaluation of the upstream drainage system** to verify and document that significant flooding and erosion impacts will not occur as a result of the proposed project. The evaluation must extend upstream to a point where any backwater effects created by the project cease.

❑ EXEMPTION FROM CORE REQUIREMENT #2

A proposed project is exempt from Core Requirement #2 if any one of the following is true:

1. The City of Issaquah determines there is sufficient information for them to conclude that the project will not have a significant adverse impact on the downstream and/or upstream drainage system, OR
2. The project adds less than 2,000 square feet of **new impervious surface**, AND less than 35,000 square feet of **new pervious surface**, AND does not **construct or modify** a drainage pipe/ditch that is 12 inches or more in size/depth or that receives runoff from a drainage pipe/ditch that is 12 inches or more in size/depth, AND does not contain or lie adjacent to a **landslide, steep slope, or erosion hazard area** as defined in IMC 18.10, OR
3. The project does not change the rate, volume, duration, or location of discharges to and from the **project site** (e.g., where existing impervious surface is replaced with other impervious surface having similar runoff-generating characteristics, or where pipe/ditch modifications do not change existing discharge characteristics).

1.2.2.1 DOWNSTREAM ANALYSIS

The level of downstream analysis required depends on specific **site** and downstream conditions. Each project submittal must include at least a Level 1 downstream analysis. Upon review of the Level 1 analysis, the City of Issaquah may require a Level 2 or Level 3 analysis. If conditions warrant, additional, more detailed analysis may be required.

The **Level 1 downstream analysis** is a qualitative survey of each downstream system and is the first step in identifying flooding or erosion problems as described below under "Downstream Drainage Problems Requiring Special Attention." Each Level 1 analysis is composed of four tasks at a minimum:

- **Task 1:** Define and map the study area
- **Task 2:** Review all available information on the study area
- **Task 3:** Field inspect the study area

- **Task 4:** Describe the drainage system, and its existing and predicted problems.

Upon review of the Level 1 analysis, the City of Issaquah may require a Level 2 or 3 downstream analysis, depending on the presence of existing or predicted flooding, erosion, or nuisance problems identified in the Level 1 analysis.

Levels 2 and 3 downstream analysis quantify downstream problems by providing information on the severity and frequency of an existing problem or the likelihood of creating a new problem. A Level 2 analysis is a rough quantitative analysis (non-survey field data, uniform flow analysis). Level 3 is a more precise analysis (survey field data, backwater analysis) of significant problems. If conditions warrant, additional, more detailed analysis may be required beyond Level 3. For Levels 2 and 3 downstream analysis, an additional **Task 5**, addressing mitigation of existing and potential problems, will be required.

Extent of Downstream Analysis

The downstream analysis must consider the existing conveyance system(s) for a **minimum flowpath distance downstream** of one-quarter mile and beyond that, as needed, to reach a point where the **project site** area constitutes less than 15% of the tributary area. This minimum distance **may be increased** as follows:

- **Task 2** of a Level 1 downstream analysis (described in detail in Section 2.3.1.1) is a review of all available information on the downstream area and is intended to identify existing drainage problems. *In all cases, this information review shall extend one mile downstream of the project site.* The existence of flooding or erosion problems further downstream may extend the one-quarter-mile minimum distance (or 15% of the tributary) for other tasks to allow evaluation of impacts from the proposed development upon the identified problems.
- If a project's impacts to flooding or erosion problems are mitigated by improvements to the downstream conveyance system, the downstream analysis will extend a minimum of one-quarter mile beyond the improvement. This is necessary because many such improvements result in a reduction of stormwater storage or an increase in peak flows from the problem location.
- At their discretion, the City of Issaquah may extend the downstream analysis beyond the minimum distance specified above on the reasonable expectation of drainage impacts.

A detailed description of the scope of offsite analysis and submittal requirements is provided in Section 2.3.1.1. Hydrologic analysis methods and requirements for Levels 2 and 3 downstream analysis are contained in Chapter 3; hydraulic analysis methods are contained in Chapter 4.

❑ DOWNSTREAM DRAINAGE PROBLEMS REQUIRING SPECIAL ATTENTION

While the area-specific flow control facility requirement in Core Requirement #3 (Section 1.2.3.2) serves to minimize the creation and aggravation of many types of downstream drainage problems, there are some types that are more sensitive to creation/aggravation than others depending on the nature or severity of the problem and which flow control facility standard is being applied. In particular, there are three types of downstream drainage problems for which the City has determined that the nature and/or severity of the problem warrants additional attention through the downstream analysis and possibly additional mitigation to ensure no creation/aggravation:

1. *Conveyance system nuisance problems*
2. *Severe erosion problems*
3. *Severe flooding problems.*

These three types of downstream drainage problem are further described below and precisely defined at the beginning of Chapter 1.

Conveyance System Nuisance Problems (Type 1)

Conveyance system nuisance problems are minor but chronic flooding or erosion problems that result from the overflow of a constructed conveyance system that is substandard or has become too small as a result of upstream development. Such problems warrant additional attention because of their chronic nature and because they result from the failure of a conveyance system to provide a minimum acceptable level of protection (see definition below).

If a *conveyance system nuisance problem* is identified or predicted downstream, the need for additional mitigation must be evaluated as specified in Section 1.2.2.2 under "DRAINAGE PROBLEM-Specific Mitigation Requirements" (p. 1-29). This may entail additional onsite flow control or other measures as needed to prevent creation or significant aggravation of the problem.

For any other nuisance problem that may be identified downstream, this manual does not require mitigation beyond the area-specific flow control facility requirement applied in Core Requirement #3 (Section 1.2.3.2) because preventing aggravation of such problems (e.g., those caused by the elevated water surfaces of ponds, lakes, wetlands, and closed depressions or those involving downstream erosion) can require two to three times as much onsite detention volume, which is considered unwarranted for nuisance problems. However, if under some unusual circumstance, the aggravation of such a nuisance problem is determined by the City of Issaquah to be a significant adverse impact, additional mitigation may be required.

Severe Erosion Problems (Type 2)

Severe erosion problems can be caused by conveyance system overflows or the concentration of runoff into erosion-sensitive open drainage features. *Severe erosion problems* warrant additional attention because they pose a significant threat either to health and safety or to public or private property.

If a *severe erosion problem* (i.e., a severe building flooding problem or severe roadway flooding problem) is identified or predicted downstream, additional mitigation must be considered as specified in Section 1.2.2.2 under "DRAINAGE PROBLEM-Specific Mitigation Requirements" (p. 1-29). This may entail additional onsite flow control or other measures as needed to prevent creation or aggravation of the problem.

Severe Flooding Problems (Type 3)

Severe flooding problems can be caused by conveyance system overflows or the elevated water surfaces of ponds, lakes, wetlands, or closed depressions. *Severe flooding problems* warrant additional attention because they pose a significant threat either to health and safety or to public or private property.

If a *severe flooding problem* is identified or predicted downstream, the need for additional mitigation must be evaluated as specified in Section 1.2.2.2 under "DRAINAGE PROBLEM-Specific Mitigation Requirements" (p. 1-29). This may entail consideration of additional onsite flow control or other measures as needed to prevent creation or significant aggravation of the problem.

1.2.2.2 DRAINAGE PROBLEM MITIGATION

A proposed project must not significantly aggravate existing downstream drainage problems or create new problems as a result of developing the site. This manual does not require development proposals to fix or otherwise reduce the severity of existing downstream drainage problems, although doing so may be an acceptable mitigation.

Principles of Impact Mitigation for Drainage Problems

Aggravation of an existing downstream problem means increasing the frequency of occurrence and/or severity of the problem. Increasing peak flows at the location of a problem caused by conveyance system overflows can increase the frequency of the problem's occurrence. Increasing durations of flows at or above the overflow return frequency can increase the severity of the problem by increasing the depth and duration of flooding. Controlling peaks and durations through onsite detention can prevent aggravation of such problems by releasing the increased volumes from development at return frequencies below the conveyance overflow return frequency, which limits their effect to just causing the conveyance system to flow full for a longer period of time.

When a problem is caused by high water-surface elevations of a volume-sensitive water body, such as a lake, wetland, or closed depression, aggravation is the same as for problems caused by conveyance overflows. Increasing the volume of flows to a volume-sensitive water body can increase the frequency of the problem's occurrence. Increasing the duration of flows for a range of return frequencies both above and below the problem return frequency can increase the severity of the problem; mitigating these impacts requires control of flow durations for a range of return frequencies both above and below the problem return frequency. The net effect of this duration control is to release the increased volumes from development only at water surface elevations below that causing the problem, which in turn can cause an increase in these lower, but more frequently occurring, water surface elevations. This underscores an unavoidable impact of development upstream of volume-sensitive water bodies: the increased volumes generated by the development will cause some range of increase in water surface elevations, no matter what detention standard is applied.

Creating a new problem means increasing peak flows and/or volumes so that after development, the frequency of conveyance overflows or water surface elevations exceeds the thresholds for the various problem types discussed in Section 1.2.2.1. For example, application of the Level 1 flow control standard requires matching the **existing site conditions** 2- and 10-year peak flows. The 100-year peak flow is only partially attenuated, and the flow increase may be enough to cause a **severe flooding problem** as described on page 1-27. The potential for causing a new problem is often identified during the Level 1 downstream analysis, where the observation of a reduction in downstream pipe sizes, for example, may be enough to predict creation of a new problem. A Level 2 or 3 analysis will typically be required to verify the capacity of the system and determine whether 100-year flows can be safely conveyed.

Significance of Impacts to Existing Drainage Problems

The determination of whether additional onsite mitigation or other measures are needed to address an existing downstream problem depends on the significance of the proposed project's predicted impact on that problem. For some identified problems, the City of Issaquah will make the determination as to whether the project's impact is significant enough to require additional mitigation. For the three types of downstream problems described on pages 1-26 and 1-27, this threshold of significant impact or aggravation is defined below.

For **conveyance system nuisance problems**, the problem is considered significantly aggravated if there is any increase in the project's contribution to the frequency of occurrence and/or severity of the problem for runoff events less than or equal to the 10-year event. *Note: Increases in the project's contribution to this type of problem are considered to be prevented if sufficient onsite flow control and/or offsite improvements are provided as specified in Table 1.2.3.A (p. 1-34).*

For **severe erosion problems**, the problem is considered significantly aggravated if there is any increase in the project's existing contribution to the *flow duration*¹⁵ of peak flows ranging from 50% of the 2-year peak flow up to the full 50-year peak flow at the eroded area. *Note: Increases in the project's contribution to this type of problem are considered to be prevented if Level 2 flow control or offsite improvements are provided as specified in Table 1.2.3.A (p. 1-34).*

For **severe building flooding problems**, the problem is considered significantly aggravated if there is any increase in the project's existing contribution¹⁶ to the frequency, depth, or duration of the problem for runoff events less than or equal to the 100-year event.

For **severe roadway flooding problems**, the problem is considered significantly aggravated if any of the following thresholds are exceeded and there is any increase in the project's existing contribution¹⁶ to the frequency, depth, or duration of the problem for runoff events less than or equal to the 100-year event:

- The *existing flooding*¹⁷ over all lanes of a **roadway** or overtopping the culverted section of a **sole access driveway** is predicted to increase in depth more than a quarter-inch or 10% (whichever is greater) for the 100-year runoff event.
- The existing flooding over all lanes of a **roadway** or severely impacting a **sole access driveway** is more than 6 inches deep or faster than 5 feet per second for runoff events less than or equal to the 100-year event. A **severely impacted sole access driveway** is one in which flooding overtops a culverted section of the driveway, posing a threat of washout or unsafe access conditions due to indiscernible driveway edges, or flooding is deeper than 6 inches on the driveway, posing a severe impediment to emergency access.
- The existing flooding over all lanes of a *sole access roadway*¹⁸ is more than 3 inches deep or faster than 5 feet per second for runoff events less than or equal to the 100-year event, or is at any depth for runoff events less than or equal to the 10-year event.

❑ DRAINAGE PROBLEM-SPECIFIC MITIGATION REQUIREMENTS

1. IF a proposed project or **threshold discharge area** within a project drains to one or more of the three types of downstream drainage problems described in Section 1.2.2.1 (pages 1-26 and 1-27) as identified through a downstream analysis, THEN the applicant must do one of the following:
 - a) Submit a Level 2 or Level 3 downstream analysis per Section 2.3.1 demonstrating that the proposed project will not create or significantly aggravate the identified downstream problem(s), OR
 - b) Show that the **natural discharge area** or **threshold discharge area** draining to the identified problem(s) qualifies for an exemption from Core Requirement #3: Flow Control (Section 1.2.3) or an exception from the applicable area-specific flow control facility requirement per Section 1.2.3.2 (p. 1-33), OR
 - c) Document that the applicable area-specific flow control facility requirement specified in Core Requirement #3 is adequate to prevent creation or significant aggravation of the identified downstream problem(s) as indicated in Table 1.2.3.A (p. 1-34) with the phrase, "No additional flow control needed," OR

¹⁵ *Flow duration* means the aggregate time that peak flows are at or above a particular flow rate (e.g., the amount of time over the last 50 years that peak flows were at or above the 2-year flow rate). *Note: flow duration is not considered to be increased if it is within the tolerances specified in Chapter 3.*

¹⁶ Increases in the project's contribution are considered to be prevented if sufficient onsite flow control and/or offsite improvements are provided as specified for **severe flooding problems** in Table 1.2.3.A (p. 1-32). For **severe flooding problems** located within the mapped FEMA 100-year floodplain increases in the project's contribution are considered negligible (zero) regardless of the flow control standard being applied, unless THE CITY OF ISSAQUAH determines there is a potential for increased flooding separate from that associated with the existing mapped FEMA 100-year floodplain.

¹⁷ *Existing flooding*, for the purposes of this definition, means flooding over all lanes of the roadway or driveway has occurred in the past and can be verified by City records, City personnel, photographs, or other physical evidence.

¹⁸ *Sole access roadway* means there is no other flood-free route for emergency access to one or more dwelling units.

- d) Provide additional onsite flow control necessary to prevent creation or significant aggravation of the downstream problem(s) as specified in Table 1.2.3.A (p. 1-34) and further detailed in Section 3.3.5, OR
 - e) Provide offsite improvements necessary to prevent creation or significant aggravation of the identified downstream drainage problem(s) as detailed in Chapter 3 unless identified as not necessary in Table 1.2.3.A (p. 1-34), OR
 - f) Provide a combination of additional onsite flow control and offsite improvements sufficient to prevent creation or significant aggravation of the downstream drainage problem(s) as demonstrated by a Level 2 or Level 3 downstream analysis.
- 2. IF it is identified that the manner of discharge from a proposed project may create a significant adverse impact as described in Core Requirement #1, THEN the City of Issaquah may require the applicant to implement additional measures or demonstrate that the impact will not occur.
 - 3. IF it is identified through a critical area review per IMC 18.10 that the quantity of surface and storm water runoff from a proposed project or ***threshold discharge area*** within a proposed project could significantly alter the hydrology of a wetland, THEN the City of Issaquah may require the applicant to implement additional flow control or other measures to mitigate the adverse impacts of this alteration in accordance with the wetland hydrology protection guidelines in Reference Section 5.

Intent: To ensure provisions are made (if necessary) to prevent creation or significant aggravation of the three types of downstream problems requiring special attention by this manual, and to ensure compliance with the discharge requirements of Core Requirement #1.

In addressing downstream problems per Problem-Specific Mitigation Requirement 1 above, additional onsite flow control will often be the easiest provision to implement. This involves designing the required onsite flow control facility to meet an additional set of performance criteria targeted to prevent significant aggravation of specific downstream problems. To save time and analysis, a set of predetermined flow control performance criteria corresponding to each of the three types of downstream problems is provided in Table 1.2.3.A (p. 1-34) and described in more detail in Chapter 3.

Note that in some cases the area-specific flow control facility requirement applicable to the proposed project per Section 1.2.3.2 (p. 1-33) is already sufficient to prevent significant aggravation of many of the defined downstream problem types. Such situations are noted in Table 1.2.3.A (p. 1-34) as not needing additional onsite flow control or offsite improvements. For example, if the project is located within a Conservation Flow Control Area subject to the Level 2 flow control standard per Section 1.2.3.2.B (p. 1-37), and a ***conveyance system nuisance problem*** is identified through offsite analysis per Core Requirement #2, no additional onsite flow control is needed, and no offsite improvements are necessary.

1.2.3 CORE REQUIREMENT #3: FLOW CONTROL

Table 1.1.1.A summarizes the detention (flow control) requirements for projects subject to Drainage Review. Unless a specific exception can be applied to the project, all proposed projects, including **redevelopment projects**, must provide onsite flow control facilities or flow control BMPs or both to mitigate the impacts of storm and surface water runoff generated by **new impervious surface**, **new pervious surface**, and **replaced impervious surface** targeted for flow mitigation as specified in the following sections. **Flow control facilities** must be provided and designed to perform as specified by the area-specific flow control facility requirement in Section 1.2.3.2 (p. 1-33) and in accordance with the applicable flow control facility implementation requirements in Section 1.2.3.3 (p. 1-41).

In certain areas of the City stormwater **Low Impact Development (LID)** must be provided as required in Special Requirement #6, using the flow control BMPs methods and procedures contained in Section 6.2. These requirements are in addition to flow control requirements contained in Core Requirement #3. However, LID can result in flow control credits that can reduce facility sizes (See Section 1.2.3.B).

Intent: To ensure the minimum level of control needed to protect downstream properties and resources from increases in peak, duration, and volume of runoff generated by new development. The level of control varies depending on location and downstream conditions identified under Core Requirement #2.

1.2.3.1 EXEMPTIONS TO CORE REQUIREMENT #3

Possible exemptions from the flow control provisions of Core Requirement #3 are summarized below:

1. Basic Exemption

A proposed project is exempt if it meets all of the following criteria:

- a) Less than 5,000 square feet of **new** plus **replaced impervious surface** will be created, AND
- b) Less than 35,000 square feet of **new pervious surface**¹⁹ will be added.

2. Impervious Surface Exemption for Transportation Redevelopment Projects

A proposed **transportation redevelopment project** is exempt if it meets all of the following criteria:

- a) Less than 5,000 square feet of **new impervious surface** will be added, AND
- b) Less than 35,000 square feet of **new pervious surface**¹⁹ will be added, AND
- c) The **total new impervious surface** within the project limits is less than 50% of the existing impervious surface.

3. Cost Exemption for Parcel Redevelopment Projects

A proposed **redevelopment project** on a single or multiple parcel **site** is exempt if it meets all of the following criteria:

- a) Less than 5,000 square feet of **new** plus **replaced impervious surface** will be created, AND
- b) Less than 35,000 square feet of **new pervious surface**¹⁹ will be added, AND

¹⁹ Note: If the project's **new pervious surface** exceeds 7,000 square feet, the soil moisture holding capacity of the **new pervious surface** must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred, except in areas subject to a state surface mine reclamation permit or that are incorporated into a drainage facility or engineered as structural fill or slope. The specifications for soil amendment can be found in Reference Section 4A.

- c) The **valuation** of the project's proposed improvements (including interior improvements and excluding required mitigation improvements) is less than 50% of the assessed value of the existing *site* improvements.

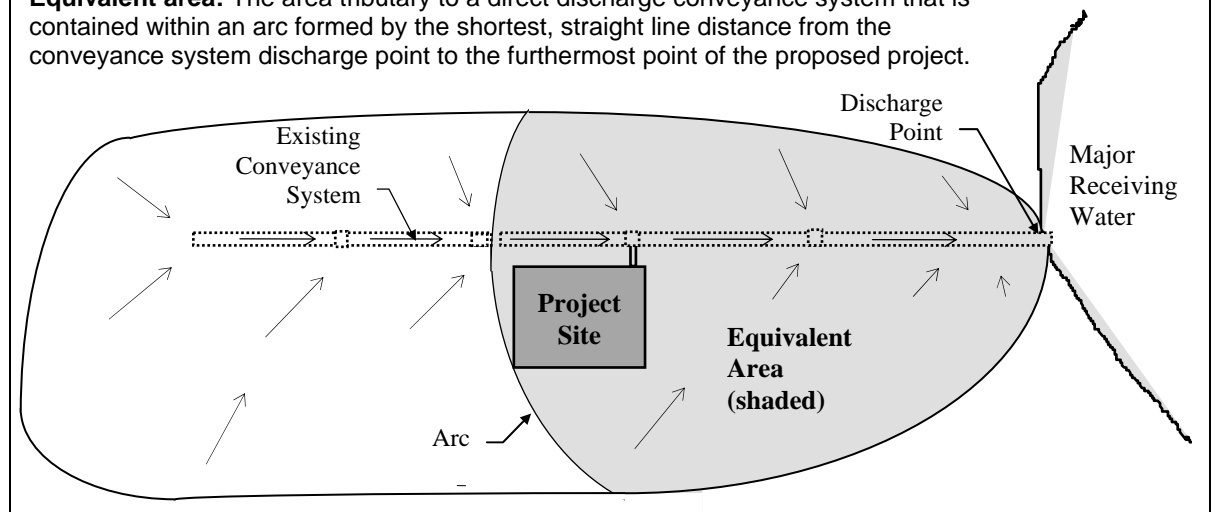
4. Direct Discharge Exemption

Any onsite **natural drainage area** is exempt from the flow control facility requirement if the area drains to Lake Sammamish, AND meets the following criteria for *direct discharge*²⁰ to that receiving water:

- The conveyance system between the *project site* and Lake Sammamish (a *major receiving water*) will extend to the ordinary high water mark, and will be **comprised of manmade conveyance elements** (pipes, ditches, outfall protection, etc.) and will be within public right-of-way or a public or private drainage easement, AND
- The conveyance system will have **adequate capacity**²¹ per Core Requirement #4, Conveyance System, for the entire contributing drainage area, assuming **build-out conditions** to current zoning for the *equivalent area* portion (defined in Figure 1.2.3.A, below) and existing conditions for the remaining area, AND
- The conveyance system will be adequately **stabilized to prevent erosion**, assuming the same basin conditions as assumed in Criteria (c) above, AND
- The direct discharge proposal will not **divert flows** from or increase flows to an **existing wetland or stream** sufficient to cause a significant adverse impact.

FIGURE 1.2.3.A EQUIVALENT AREA DEFINITION AND ILLUSTRATION

Equivalent area: The area tributary to a direct discharge conveyance system that is contained within an arc formed by the shortest, straight line distance from the conveyance system discharge point to the furthestmost point of the proposed project.



²⁰ Direct discharge means undetained discharge from a proposed project to a *major receiving water*.

²¹ Note: If the conveyance system is an existing City-owned system, the City may charge a special use fee equal to or based on the property value/replacement cost of the system capacity being used.

1.2.3.2 FLOW CONTROL REQUIREMENTS

Projects subject to Core Requirement #3 must provide flow control facilities as specified by the area-specific facility requirements and exceptions for the **designated flow control area** in which the proposed project or **threshold discharge area** of the proposed project is located as described in Subsections A, B, and C, below.

Definition of Designated Flow Control Areas in Issaquah

1. **Conservation Flow Control Areas**, requiring the Level 2 flow control standard, include all areas unless otherwise noted under Basic Flow Control, below.
2. **Basic Flow Control Areas**, requiring the Level 1 flow control standard, include projects with <1.0 acre of total land disturbance that discharge to the Issaquah Valley Floor (see Table 1.1.1.A, Case F1)

Note that the minimum required performance of the facility as specified by the **designated flow control area** requirement may need to be increased to ensure that downstream problems are not created or significantly aggravated as set forth in Section 1.2.2.2, "Problem-Specific Mitigation Requirements" (p. 1-29). Table 1.2.3.A (p. 1-34) provides a quick guide for selecting the flow control performance criteria necessary to meet both the **designated flow control area** flow control facility requirement and the problem-specific mitigation requirement. This is further explained in Step 4 below.

For efficient application of the flow control facility requirement, the following steps are recommended:

1. Check the Direct Discharge Exemption on Page 1-32 to determine if and/or which portions of your project are exempt from the flow control facility requirement. If exempt from the flow control facility requirement, proceed to Step 6.
2. The **designated flow control areas** are defined above and explained on subsequent pages for each of the flow control areas.
3. If downstream problems were identified through offsite analysis per Core Requirement #2 and are proposed to be addressed through onsite flow control, use Table 1.2.3.A (p. 1-34) to determine if and what additional flow control performance is necessary to mitigate impacts (i.e., to prevent creation or aggravation of the identified problems).
4. Use Section 1.2.3.3 (p. 1-41) to identify the applicable requirements for implementing the flow control facility requirement. These requirements cover facility siting, analysis and design, unusual situations, and other site-specific considerations.
5. See Special Requirement #6 to determine the required low impact development BMPs that must be applied to your **project site**.

TABLE 1.2.3.A SUMMARY OF FLOW CONTROL PERFORMANCE CRITERIA ACCEPTABLE FOR IMPACT MITIGATION⁽¹⁾			
IDENTIFIED PROBLEM DOWNSTREAM	AREA-SPECIFIC FLOW CONTROL FACILITY REQUIREMENT		
	Basic Flow Control (FC) Areas	Conservation FC Areas	Flood Problem FC Areas
No Problem Identified Apply the minimum area-specific flow control performance criteria.	Apply the Level 1 flow control standard, which matches existing site conditions 2- and 10-year peaks	Apply the historic site conditions Level 2 flow control standard, which matches historic durations for 50% of 2-yr through 50-year peaks AND matches historic 2- and 10-year peaks	Apply the existing or historic site conditions Level 2 flow control standard (whichever is appropriate based on downstream flow control area) AND match existing site conditions 100-year peaks
Type 1 Drainage Problem Conveyance System Nuisance Problem	<u>Additional Flow Control</u> Hold 10-year peak to overflow T_r peak ⁽²⁾⁽³⁾	<i>No additional flow control or other mitigation is needed</i>	<i>No additional flow control or other mitigation is needed</i>
Type 2 Drainage Problem Severe Erosion Problem	<u>Additional Flow Control</u> Apply the existing site conditions Level 2 flow control standard ⁽³⁾⁽⁴⁾	<i>No additional flow control is needed, but other mitigation may be required⁽⁴⁾</i>	<i>No additional flow control is needed, but other mitigation may be required⁽⁴⁾</i>
Type 3 Drainage Problem Severe Flooding Problem	<u>Additional Flow Control</u> Apply the existing site conditions Level 3 flow control standard to peak flows above the overflow T_r peak.	<u>Additional Flow Control</u> Apply the historic site conditions Level 3 flow control standard	<u>Additional Flow Control</u> If flooding is from a closed depression, make design adjustments as needed to meet the "special provision for closed depressions" ⁽³⁾
Potential Impact to Wetland Hydrology as Determined through a Critical Area Review per IMC 18.10	<u>Additional Flow Control</u> The City of Issaquah may require design adjustments per the wetland hydrology protection guidelines in Reference Section 5	<u>Additional Flow Control</u> The City of Issaquah may require design adjustments per the wetland hydrology protection guidelines in Reference Section 5	<u>Additional Flow Control</u> The City of Issaquah may require design adjustments per the wetland hydrology protection guidelines in Reference Section 5
<p><i>Notes:</i></p> <p><i>Shaded cells indicate the default drainage standard.</i></p> <p>⁽¹⁾ More than one set of problem-specific performance criteria may apply if two or more downstream problems are identified through offsite analysis per Core Requirement #2. If this happens, the performance goals of each applicable problem-specific criteria must be met. This can require extensive, time-consuming analysis to implement multiple sets of outflow performance criteria if additional onsite flow control is the only viable option for mitigating impacts to these problems. In these cases, it may be easier and more prudent to implement the historic site conditions Level 3 flow control standard in place of the otherwise required area-specific standard. Use of the historic Level 3 flow control standard satisfies the specified performance criteria for all the area-specific and problem-specific requirements except if adjustments are required per the special provision for closed depressions described below in Note 5.</p> <p>⁽²⁾ Overflow T_r is the return period of conveyance system overflow. To determine T_r requires a minimum Level 2 downstream analysis as detailed in Section 2.3.1.1. To avoid this analysis, a T_r of 2 years may be assumed.</p> <p>⁽³⁾ Offsite improvements may be implemented in lieu of or in combination with additional flow control as allowed in Section 1.2.2.2 (p. 1-28) and detailed in Section 3.3.5.</p> <p>⁽⁴⁾ A tightline system may be required regardless of the flow control standard being applied if needed to meet the discharge requirements of Core Requirement #1 (p. 1-23) or the outfall requirements of Core Requirement #4 (p. 1-49), or if deemed necessary by The City of Issaquah where the risk of severe damage is high.</p>			

A. BASIC FLOW CONTROL AREAS

Basic Flow Control Areas are designated in areas where the City of Issaquah has determined that maintaining peak flows using the Level 1 flow control criteria is sufficient to protect natural and constructed conveyance systems. ***This includes projects with total disturbance of less than 1.0 acre and located on the Issaquah Valley floor (See Table 1.1.1.A).*** Projects located above the valley floor but have all stormwater tight-lined to an outfall located on the valley floor also meet this definition. The exact location of the boundary between the valley floor and the adjacent hillside will be made by City staff based on available topographic information and site visits. The intent is for stormwater to discharge to open channels and streams that are not susceptible to erosion and scour. In addition for allowing Level 1 flow control at these sites, this exception exempts replaced impervious surfaces from the flow control requirement (i.e., pre-developed conditions are based on existing site conditions). This does not exempt the requirements for new impervious and pervious surfaces. Projects incorporating Level 1 flow control must not be part of a larger common plan of development or sale, and stormwater must discharge to low-gradient open channels and streams physically located on the Issaquah Valley floor.

*Note: For projects located at or near the delineated boundary of the Basic Flow Control Area, site-specific topography or drainage information may be needed to determine whether a project or any **threshold discharge area** of a project is indeed within the flow control area. Any **threshold discharge area** is considered to be within the Basic Flow Control Area if the **threshold discharge area** drains to a waterbody or drainage system that is clearly located on the valley floor.*

Within Basic Flow Control Areas, required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities in **Basic Flow Control Areas** must comply with the following flow control performance standards and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A, p. 1-34):

Level 1 Flow Control: Match the developed peak discharge rates to ***existing site conditions*** peak discharge rates for 2- and 10-year return periods. (Existing site conditions is based on 1979 land use).

Reduced Level 1 Flow Control: A modified version of this standard, controlling only the 10-year frequency peak flow rate, is allowed if the applicant demonstrates both of the following:

- The proposed ***project site*** discharges to a conveyance system not subject to erosion that extends from the project discharge point to Lake Sammamish, AND
- There is no evidence of capacity problems along this conveyance system as determined by offsite analysis per Core Requirement #2, or such problems will be resolved prior to project construction.

Intent

The Level 1 flow control standard is intended to protect flow-carrying capacity and limit increased erosion within the downstream conveyance system for runoff events less than or equal to the 10-year event. Matching the 2- and 10-year peak flows is intended to prevent increases in return-frequency peak flows less than or equal to the 10-year peak flow down to the 2-year peak flow. This level of control is also intended to prevent creation of new ***conveyance system nuisance problems*** as described in Section 1.2.2.1.

Effectiveness in Addressing Downstream Drainage Problems

While the Level 1 flow control standard provides reasonable protection from many development-induced conveyance problems (up to the 10-year event), it does not prevent increases in runoff volumes or flow durations that tend to aggravate the three types of downstream problems described in Section 1.2.2.1. Consequently, if one or more of these problems are identified through offsite analysis per Core Requirement #2, additional onsite flow control and/or offsite improvements will likely be required (see "Problem-Specific Mitigation Requirements" in Section 1.2.2.2, p. 1-29).

Target Surfaces

Facilities in **Basic Flow Control Areas** must mitigate (either directly or in effect) the runoff from the following target surfaces within the **threshold discharge area** for which the facility is required:

1. **New impervious surface** that is **not fully dispersed** per the criteria on Page 1-41. For individual lots within residential subdivision projects, the extent of **new impervious surface** shall be assumed as specified in Chapter 3. *Note, any new impervious surface such as a bridge that spans the ordinary high water of a stream, pond, or lake may be excluded as a target surface if the runoff from such span is conveyed to the ordinary high water area in accordance with Criteria (b), (c), (d), and (e) of the "Direct Discharge Exemption" (p 1-32).*
2. **New pervious surface** that is **not fully dispersed**. For individual lots within residential subdivision projects, the extent of **new pervious surface** shall be assumed to be the entire lot area, except the assumed impervious portion and any portion in which native conditions are preserved by covenant, tract, or easement. In addition, the **new pervious surface** on individual lots shall be assumed to be 100% grass if located within the Urban Growth Area (UGA) and 50% grass/50% pasture if located outside the UGA.

Exceptions

The following exceptions apply only in **Basic Flow Control Areas**:

1. The facility requirement in Basic Flow Control Areas is waived for any **threshold discharge area** in which the target surfaces subject to this requirement will generate no more than a **0.1-cfs increase** in the **existing site conditions** 100-year peak flow. *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Table 1.2.3.B (p. 1-43).*
2. The facility requirement in Basic Flow Control Areas may be waived for any **threshold discharge area** of a **redevelopment project** in which all of the following criteria are met:
 - a) The target surfaces subject to the Basic Flow Control Areas facility requirement will generate no more than a **0.1-cfs increase** in the **existing site conditions** 100-year peak flow at any **natural discharge location** from the **project site** (*note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Table 1.2.3.B, p. 1-43*), AND
 - b) The increased runoff from target surfaces will not significantly impact a critical area, **severe flooding problem**, or **severe erosion problem**.

B. CONSERVATION FLOW CONTROL AREAS

The City of Issaquah adopts the **Conservation Flow Control Area** for all areas, unless a specific exception has been provided as summarized in Table 1.1.1.A and described under Basic Flow Control Areas. Within Conservation Flow Control Areas a Level 2 flow control criteria applies and the required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities in **Conservation Flow Control Areas** must comply with the following flow control performance standard and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A, p. 1-34):

Level 2 Flow Control: Match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. Also match developed peak discharge rates to predeveloped peak discharge rates for the 2- and 10-year return periods. For redevelopment projects (i.e., >35% existing impervious surface area at the project site) assume *historic site conditions* as the predeveloped condition for the targeted surfaces. For new development projects (i.e., <35% existing impervious surface area at the project site) assume *historic site conditions* as the predeveloped condition for all targeted surfaces except flow control for replaced impervious surfaces is not required.

Intent

The Level 2 flow control standard assuming *historic site conditions* is intended to limit the amount of time that erosive flows are at work generating erosion and sedimentation within natural and constructed drainage systems. Such control is effective in preventing development-induced increases in natural erosion rates and reducing existing erosion rates where they may have been increased by past development of the *site*. This is accomplished by maintaining at historic predevelopment levels the aggregate time that developed flows exceed an erosion-causing threshold (i.e., 50% of the historic 2-year peak flow). Maintaining natural erosion rates within streams and their tributary areas is important for preventing increases in stream channel erosion and sediment loading that are detrimental to salmonid habitat and production.

Effectiveness in Addressing Downstream Drainage Problems

While the Level 2 flow control standard assuming *historic site conditions* provides a reasonable level of protection for preventing most development-induced problems, it does not necessarily prevent increases in *existing site conditions* 100-year peak flows that can aggravate *severe flooding problems* as described in Core Requirement #2, nor does it necessarily prevent aggravation of all *severe erosion problems*. Consequently, if one or more of these problems are identified through offsite analysis per Core Requirement #2, additional onsite flow control and/or offsite improvements will likely be required (see "Drainage Problem-Specific Mitigation Requirements" in Section 1.2.2.2, p. 1-29).

Target Surfaces

Facilities in **Conservation Flow Control Areas**²² must mitigate (either directly or in effect) the runoff from the following target developed surfaces within the *threshold discharge area* for which the facility is required:

1. *New impervious surface* that is **not fully dispersed** per the criteria on Page 1-41. For individual lots within residential subdivision projects, the extent of *new impervious surface* shall be assumed as

²² Note: Any *threshold discharge area* that appears to be located within a Conservation Flow Control Area according to the Flow Control Applications Map but drains entirely by non-erodible manmade conveyance to a *major receiving water* (listed on page 1-30) is considered to be located within a Basic Flow Control Area.

specified in Chapter 3. *Note, any **new impervious surface** such as a bridge that spans the ordinary high water of a stream, pond, or lake may be excluded as a target surface if the runoff from such span is conveyed to the ordinary high water area in accordance with Criteria (b), (c), (d), and (e) of the "4. Direct Discharge Exemption" (p 1-32).*

2. **New pervious surface** that is **not fully dispersed**. For individual lots within residential subdivision projects, the extent of **new pervious surface** shall be assumed to be the entire lot area, except the assumed impervious portion and any portion in which native conditions are preserved by covenant, tract, or easement. In addition, the **new pervious surface** on individual lots shall be assumed to be 100% grass if located within the Urban Growth Area (UGA) and 50% grass/50% pasture if located outside the UGA.
3. **Existing impervious surface** added since January 8, 2001 that is **not fully dispersed** and not yet mitigated with a City-approved flow control facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. **Replaced impervious surface** that is **not fully dispersed** on a **transportation redevelopment project** in which **new impervious surface** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
5. **Replaced impervious surface** that is **not fully dispersed** on a **parcel redevelopment project** in which the total of new plus **replaced impervious surface** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing **site** improvements.

Exceptions

The following exceptions apply only in **Conservation Flow Control Areas**²²:

1. The facility requirement in Conservation Flow Control Areas is waived for any **threshold discharge area** in which there is **no more than a 0.1-cfs difference** in the sum of developed 100-year peak flows for those target surfaces subject to this requirement and the sum of **historic site conditions** 100-year peak flows for the same surface areas. *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Table 1.2.3.B (p. 1-43).*
2. The facility requirement in Conservation Flow Control Areas may be reduced or waived for any **threshold discharge area** where a **plan or study** approved by the City and Department of Ecology shows that a lower standard (e.g., Level 1 flow control) is sufficient or no facility is necessary to protect or allow for restoration of water body beneficial uses and habitat functions essential to salmonids.
3. The facility requirement in Conservation Flow Control Areas as applied to **replaced impervious surface** may be reduced using the adjustment process if the cost of flow control facilities to mitigate all surfaces exceeds that necessary to mitigate only for new impervious surface plus new pervious surface and also exceeds 1/3 of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new development site, whichever is less. The amount of reduction shall be limited such that the cost of flow control facilities is at least equal to that necessary to mitigate only for new impervious surface plus new pervious surface, and beyond this amount, is no greater than 1/3 of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new development site, whichever is less.

C. FLOOD PROBLEM FLOW CONTROL AREAS

Flood Problem Flow Control Areas are designated where the City has determined that a higher average level of flow control is needed to prevent aggravation of existing documented flooding problems. Such areas are identified by downstream analysis per Core Requirement #2 and Table 1.2.3.A.

Within Flood Problem Flow Control Areas, required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities in **Flood Problem Flow Control Areas** must comply with the following flow control performance standard and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A):

Level 3 Flow Control: Apply the Level 2 flow control standard, AND match the developed 100-year peak discharge rate to the predeveloped 100-year peak discharge rate. If the Flood Problem Flow Control Area is located within a Conservation Flow Control Area and does not drain entirely by non-erodible manmade conveyance to a **major receiving water** (listed on page 1-32), then **historic site conditions** shall be assumed as the predeveloped condition except for the purposes of matching 100-year peak discharge rates. For all other situations and for the purposes of matching 100-year peak discharge rates, **existing site conditions** may be assumed.

Intent

The Level 3 flow control standard is intended to prevent significant increases in existing water surface levels for 2-year through 100-year return frequencies. Such increases are expected to occur as the volume of runoff discharging to the water body is increased by upstream development. Because inflow rates to these water bodies are typically much higher than the outflow rates, increased runoff volumes from upstream development are, in effect, stacked on top of existing volumes in the water body, resulting in higher water surface levels. The duration-matching and 100-year peak-matching criteria of the Level 3 flow control standard counteract this stacking effect by slowing the arrival of additional runoff volumes. Because it can prevent significant aggravation of existing flooding, the Level 3 standard is also applicable to other flow control areas where **severe flooding problems** have been identified per Core Requirement #2.

Effectiveness in Addressing Downstream Drainage Problems

If the Level 3 flow control standard is implemented onsite, no additional measures are required to prevent aggravation of the three types of downstream drainage problems described in Core Requirement #2. The one exception is for a wetland or lake that is a closed depression with a **severe flooding problem**, and the proposed project is adding impervious surface area amounting to more than 10% of the 100-year water surface area of the closed depression. In this case, additional onsite flow control or offsite improvements may be necessary as determined by a "point of compliance analysis" (see "Special Provision for Closed Depressions" in Table 1.2.3.A, and see Section 3.3.6, "Point of Compliance Analysis").

Target Surfaces

Facilities in **Flood Problem Flow Control Areas** must mitigate (either directly or in effect) the runoff from the following target developed surfaces within the **threshold discharge area** for which the facility is required:

1. If the Flood Problem Flow Control Area is **located within a Conservation Flow Control Area**, then the target surfaces are the same as those required for facilities in Conservation Flow Control Areas unless otherwise allowed by the area-specific exceptions for Conservation Flow Control Areas. *Note: Any Flood Problem Flow Control Area that appears to be located within a Conservation Flow*

*Control Area identified on the Flow Control Applications Map, but drains entirely by non-erodible manmade conveyance to a **major receiving water** (listed on page 1-32), is considered to be located within a Basic Flow Control Area.*

2. If the Flood Problem Flow Control Area is **located within a Basic Flow Control Area** or drains entirely by non-erodible manmade conveyance to a **major receiving water**, then the target surfaces are the same as those required for facilities in Basic Flow Control Areas (see p. 1-35).

Exceptions

The following exceptions apply only in **Flood Problem Flow Control Areas**:

1. If the Flood Problem Flow Control Area is **located within a Conservation Flow Control Area**, then the facility requirement is waived for any **threshold discharge area** in which there is no more than a 0.1-cfs difference in the sum of developed 100-year peak flows for the target surfaces subject to this requirement and the sum of **historic site conditions** 100-year peak flows for the same surface areas. *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Table 1.2.3.B (p. 1-43). Also, any Flood Problem Flow Control Area that appears to be located within a Conservation Flow Control Area identified on the Flow Control Applications Map, but drains entirely by non-erodible manmade conveyance to a **major receiving water** (listed on page 1-32), is considered to be located within a Basic Flow Control Area.*
2. If the Flood Problem Flow Control Area is **located within a Basic Flow Control Area**, then the facility requirement is waived for any **threshold discharge area** in which the target surfaces subject to this requirement will generate no more than a 0.1-cfs increase in the **existing site conditions** 100-year peak flow. *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Table 1.2.3.B (p. 1-43).*
3. Any required application of the Flood Problem Flow Control Areas facility requirement to **replaced impervious surface** may be waived if the City has adopted a plan and implementation schedule approved by the state Department of Ecology for fulfilling this requirement with regional facilities.
4. Any required application of the Flood Problem Flow Control Areas facility requirement to **replaced impervious surface** may be reduced by the City using the procedures detailed in Sections 1.4.3 and 1.4.4 of the adjustment process, if the **cost of flow control facilities** to mitigate all target surfaces exceeds that necessary to mitigate only for **new impervious surface** plus **new pervious surface** and also exceeds $\frac{1}{3}$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate the same surfaces on a new **development site**, whichever is less. The amount of reduction allowed by this exception shall be limited such that the **cost of flow control facilities** is at least equal to that necessary to mitigate only for **new impervious surface** plus **new pervious surface**, and beyond this amount, is no greater than $\frac{1}{3}$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new **development site**, whichever is less.
5. Any required application of the Flood Problem Flow Control Areas facility requirement to **replaced impervious surface** may assume **existing site conditions** as the predeveloped condition for the purposes of matching the developed 100-year peak discharge rate to the predeveloped 100-year peak discharge rate.

1.2.3.3 FLOW CONTROL FACILITY IMPLEMENTATION REQUIREMENTS

Flow control facilities shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions:

A. ONSITE VS. OFFSITE IMPLEMENTATION

All required flow control facilities should be implemented onsite, except where the requirements below can be met by direct discharge to a shared facility constructed to provide flow control for the proposed project. If physical or operational issues or conflicts make an onsite facility infeasible, an offsite (compensatory) facility may be approved by the City through the adjustment process. Offsite stormwater mitigation located on private property will require ownership of the property or a perpetual easement recorded against the deed.

Shared facilities may be constructed under a City-developed shared facility drainage plan or under an agreement between two or more private developers.

1. The shared facility must be of adequate size and design to meet the **current** flow control requirements for the proposed project. If the current flow control requirements differ from those used to originally design the shared facility, additional analysis and possible retrofitting of the facility may be required to ensure adequate size and design.
2. The shared facility must be fully operational at the time of construction of the proposed project and must comply with the terms and conditions of all contracts, agreements, and permits associated with the shared facility. If the offsite facility is an existing City-owned facility, the City may charge a special use fee equal to or based on the property value of the detention capacity being used.

B. METHODS OF ANALYSIS AND DESIGN

Flow control facilities must be analyzed and designed using a continuous flow simulation method such as HSPF (Hydrologic Simulation Program FORTRAN) or the simplified HSPF-based runoff files method. Specifications for use of the runoff files method and associated computer program, KCRTS, are found in Chapter 3. Detailed design specifications for flow control facilities are found in Chapter 5. Ecology's Western Washington Hydrology Model (WWHM) is also approved by the City for applications contained in this manual.

C. SIZING CREDITS FOR FULLY DISPERSED SURFACES

A **fully dispersed** surface (either impervious or non-native pervious) is one that conforms to the BMP strategy for "full dispersion" detailed in Appendix C, Section C.2.1. This strategy calls for minimizing the area of onsite developed surface relative to **native vegetated surface**, together with the application of dispersion techniques that utilize the natural retention/detention capacity of the **native vegetated surface** to mitigate the runoff effects of the developed surfaces. Developed surfaces conforming to this strategy are considered to have a negligible impact downstream, and therefore, may be modeled as forest and are not subject to the area-specific flow control facility requirement (Section 1.2.3.2) or the area-specific water quality facility requirement (Section 1.2.8). In order for developed surfaces to qualify as **fully dispersed**, they must meet the basic criteria listed below and further detailed in Appendix C, Section C.2.1.

Criteria for Fully Dispersed Surfaces

1. The **total area of impervious surface** being **fully dispersed** must be no more than 15% of the total area of **native vegetated surface** being preserved by recorded tract, easement, or covenant within the same **threshold discharge area**. The total area of impervious surface plus *non-native pervious surface*²³ being **fully dispersed** must be no more than 35% of a **threshold discharge area**.

²³ *Non-native pervious surface* means a pervious surface that does not meet the definition of a **native vegetated surface**.

2. The runoff from a **fully dispersed** surface must be discharged using one of the following **dispersion devices** in accordance with the design specifications and maximum area of **fully dispersed** surface for each device set forth in Appendix C, Section C.2.1.
 - a) **Splash blocks**
 - b) **Rock pads**
 - c) **Gravel filled trenches**
 - d) **Sheet flow**

*Note: The dispersion device must be situated so as to discharge within the same **threshold discharge area** of the surface it serves.*

3. A **native vegetated flowpath segment** of at least 100 feet in length (25 feet for sheet flow from a non-native pervious surface) must be available along the flowpath that runoff would follow upon discharge from a dispersion device listed in Minimum Requirement 2 above. The native vegetated flowpath segment **must meet all of the following criteria**:
 - a) The flowpath segment must be over **native vegetated surface**.
 - b) The flowpath segment must be **onsite or an offsite tract or easement area** reserved for such dispersion.
 - c) The **slope** of the flowpath segment must be **no steeper than 15%** for any 20-foot reach of the flowpath segment.
 - d) The flowpath segment must be located **between the dispersion device and any downstream drainage feature** such as a pipe, ditch, stream, river, pond, lake, or wetland.
 - e) The flowpath segments for adjacent dispersion devices must comply with the **minimum spacing requirements** in Appendix C, Section C.2.2. These requirements do not allow overlap of flowpath segments, except in the case where **sheet flow from a non-native pervious surface** overlaps with the flowpath of any dispersion device listed in Minimum Requirement 2 above. In this case, the longest of the two overlapping flowpath segments must be extended at least 1 foot for every 3 feet of distance along the most representative path that runoff would travel from the upstream end to the discharge end of the non-native pervious surface.
4. On **sites with septic systems**, the discharge of runoff from dispersion devices must not be upgradient of the drainfield. This requirement may be waived by the City of Issaquah if **site** topography clearly prohibits flows from intersecting the drainfield.
5. The dispersion of runoff must not create **flooding or erosion impacts** as determined by the City of Issaquah. If runoff is proposed to be discharged toward a **landslide hazard area, erosion hazard area, or steep slope hazard area** (i.e., slopes steeper than 20%), The City of Issaquah may require the applicant to have the proposal evaluated by a geotechnical engineer or engineering geologist.

D. SIZING CREDITS FOR USE OF FLOW CONTROL BMPS

When sizing flow control facilities and assessing exceptions from the flow control facility requirement, target impervious surfaces served by a flow control BMP that meets the design specifications for that BMP in Appendix C and the requirements for use of BMP credits in Section 5.2.2 may be modeled as specified in Table 1.2.3.B below. Flow control sizing credits contained in Appendix III-C of the Department of Ecology Stormwater Management Manual for Western Washington (2005), in the Puget Sound Action Team Low Impact Development Technical Guidance Manual for Puget Sound (January 2005), or other LID design guidance manual accepted by King County or the Department of Ecology may also be used.

TABLE 1.2.3.B FLOW CONTROL BMP FACILITY SIZING CREDITS ⁽¹⁾	
Flow Control BMP Type	Facility Sizing Credit
Full dispersion	Model fully dispersed surface as forest
Full infiltration ⁽²⁾	Subtract impervious area that is fully infiltrated
Limited infiltration	Model tributary impervious surface as 50% impervious, 50% grass
Basic dispersion	Model dispersed impervious surface as 50% impervious, 50% grass
Rain garden	Model tributary impervious surface as 50% impervious, 50% grass
Permeable pavement (non-grassed)	For private facilities: Model permeable pavement area as 50% impervious, 50% grass. For public facilities: Model permeable pavement area as 100% grass. (No underlying drain pipes).
Grassed modular grid pavement	Model permeable pavement as all grass
Rainwater harvesting	Subtract area that is fully controlled
Vegetated roof	Model vegetated roof area as 50% impervious, 50% grass
Restricted footprint	Model footprint as restricted
Wheel strip driveways	Model credited area as 50% impervious, 50% grass
Minimum disturbance foundation	Model foundation area as 50% impervious, 50% grass
Open grid decking over pervious area	Model deck area as 50% impervious, 50% grass
Native growth retention credit	Model mitigated impervious area as 50% impervious, 50% grass
Perforated pipe connection	None
Notes: ⁽¹⁾ These credits do not apply when determining eligibility for exemptions from Core Requirement #3 or exceptions from the flow control facility requirement unless otherwise noted in the exemption or exception. ⁽²⁾ For single family residential projects the design requirements and specifications in Appendix C, Section C.2.2 may be used for design of full infiltration. For all other projects, full infiltration must be designed in accordance with infiltration facility standards in Section 5.4.	

E. MITIGATION OF TARGET SURFACES THAT BYPASS FACILITY

On some *sites*, topography may make it difficult or costly to collect all target surface runoff for discharge to the onsite flow control facility. Therefore, some project runoff subject to flow control may bypass required onsite flow control facilities provided that all of the following conditions are met:

1. The **point of convergence** for runoff discharged from the bypassed target surfaces and from the project's flow control facility must be within a **quarter-mile downstream²⁴** of the facility's **project site** discharge point, AND
2. The increase in the **existing site conditions 100-year peak discharge** from the area of bypassed target surfaces must not exceed 0.4 cfs, AND

²⁴ Note: The City of Issaquah may allow this distance to be extended beyond a quarter mile to the point where the **project site** area constitutes less than 15% of the tributary area.

3. Runoff from the bypassed target surfaces **must not create a significant adverse impact** to downstream drainage systems, salmonid habitat, or properties as determined by the City of Issaquah, AND
4. **Water quality requirements** applicable to the bypassed target surfaces must be met, AND
5. **Compensatory mitigation by a flow control facility** must be provided so that the net effect at the point of convergence downstream is the same with or without the bypass. This mitigation may be waived if the *existing site conditions* 100-year peak discharge from the area of bypassed target surfaces is increased by no more than 0.1 cfs and **flow control BMPs** as detailed in Appendix C are applied to all impervious surfaces within the area of bypassed target surfaces. One or combination of the following methods may be used to provide compensatory mitigation by a flow control facility subject to permission/approvals from other parties as deemed necessary by The City of Issaquah:
 - a) Design the project's flow control facility or retrofit an existing offsite flow control facility as needed to achieve the desired effect at the point of convergence, OR
 - b) Design the project's flow control facility or provide/retrofit an offsite flow control facility to mitigate an existing developed area (either onsite or offsite) that has runoff characteristics (i.e., peak flow and volume) equivalent to those of the bypassed target surfaces but is currently not mitigated or required to be mitigated to the same flow control performance requirement as the bypassed target surfaces.

F. BYPASS OF RUNOFF FROM NON-TARGET SURFACES

The performance of flow control facilities can be compromised if the contributing area, beyond that which must be mitigated by the facility, is too large. Therefore, IF the existing 100-year peak flow rate from any upstream area (not targeted for mitigation) is greater than 50% of the 100-year developed peak flow rate (undetained) for the area that must be mitigated, THEN the runoff from the upstream area must bypass the facility. The bypass of upstream runoff must be designed so that all of the following conditions are met:

1. Any existing contribution of flows to an **onsite wetland** must be maintained, AND
2. Upstream flows that are **naturally attenuated** by natural detention on the *project site* under predeveloped conditions must remain attenuated, either by natural means or by providing additional onsite detention so that peak flows do not increase, AND
3. Upstream flows that are **dispersed or unconcentrated** on the *project site* under predeveloped conditions must be discharged in a safe manner as described in Core Requirement #1 under "Discharge Requirements" (p. 1-23).

G. MITIGATION TRADES

A project's flow control facility may be designed to mitigate an existing developed non-target surface area (either onsite or offsite) in trade for not mitigating part or all of the project's target surface area, provided that all of the following conditions are met:

1. The **existing developed non-target surface area** (i.e., an area of existing impervious surface and/or non-native pervious surface) must have runoff discharge characteristics (i.e., peak flow and volume) equivalent to those of the target surface area for which mitigation is being traded and must not be currently mitigated to the same flow control performance requirement as the target surface area, AND
2. Runoff from both the target surface area being traded and the flow control facility **must converge prior to discharge** of the runoff from the target surface area being traded onto private property without an easement or through any area subject to erosion, AND
3. The **net effect** in terms of flow control at the point of convergence downstream must be the same with or without the mitigation trade, AND

4. The undetained runoff from the target surface area being traded **must not create a significant adverse impact** to downstream drainage systems, salmonid habitat, or properties prior to convergence with runoff from the flow control facility.

H. MANIFOLD DETENTION FACILITIES

A *manifold detention facility* is a single detention facility designed to take the place of two or more otherwise required detention facilities. It combines the runoff from two or more onsite drainage areas having separate *natural discharge locations*, and redistributes the runoff back to the *natural discharge locations* following detention. Because manifold detention facilities divert flows from one *natural discharge location* to another and then back, they are not allowed except by an approved adjustment (see Section 1.4).

I. FACILITY REQUIREMENT IN LANDSLIDE HAZARD DRAINAGE AREAS

Proposed projects subject to Discharge Requirement 2 in Core Requirement #1 (see p. 1-24) must provide a tightline system unless the 100-year runoff from the *project site* can be feasibly infiltrated or one of the other exceptions listed on page 1-24 apply. For infiltration to be used as an alternative to the tightline requirement, it must be feasible per the facility design requirements and limitations specified in Section 5.4. When evaluating the feasibility of infiltration, multiple facility locations scattered throughout the *project site* shall be considered and used where feasible and practical to avoid concentrating infiltrated water in one location. If multiple facilities are not feasible or practical, then a single infiltration facility meeting the minimum setback requirements in Section 5.4 may be used where feasible.

Where infiltration is not feasible, it is still possible for a proposed project to qualify for one of the other exceptions to the tightline requirement specified in Core Requirement #1 (p. 1-24). If such a project is subject to the flow control facility requirement in Core Requirement #3, the required facility must be a **detention pond** sized to meet, at minimum, the *historic site conditions* Level 2 flow control facility standard with a safety factor of 20% applied to the storage volume. The detention pond must be sited and designed so as to maximize the opportunity for infiltration in the pond. To accomplish this, all of the following design requirements must be met:

1. The detention pond must be preceded by either a water quality treatment facility per Core Requirement #8 or a presettling basin per Section 5.4, AND
2. All detention pond side slopes must be 3H:1V or flatter and must be earthen, AND
3. Detention pond liners that impede infiltration shall not be used, AND
4. The pond bottom shall be at or above the seasonal high groundwater table, AND
5. The detention pond outflow must meet the discharge dispersal requirements specified in Discharge Requirement 1 of Core Requirement #1 (p. 1-23).

1.2.3.4 FLOW CONTROL BMPS REQUIREMENT

Projects subject to Core Requirement #3 must apply **flow control BMPs** to impervious surfaces as directed by this section to either supplement the flow mitigation provided by required flow control facilities or provide flow mitigation where flow control facilities are not required. These flow control BMPs are also termed **stormwater Low Impact Development** requirements.

The requirements in Section 5.2 are not applicable to the City of Issaquah. These are replaced by the stormwater LID requirements contained in **Special Requirement #6**, using design specifications for each BMP that is contained in Appendix C, Section C.2.

1.2.4 CORE REQUIREMENT #4: CONVEYANCE SYSTEM

All engineered conveyance system elements for proposed projects must be analyzed, designed, and constructed to provide a minimum level of protection against overtopping, flooding, erosion, and structural failure as specified in the following groups of requirements:

- "Conveyance Requirements for New Systems," Section 1.2.4.1 (below)
- "Conveyance Requirements for Existing Systems," Section 1.2.4.2 (p. 1-47)
- "Conveyance System Implementation Requirements," Section 1.2.4.3 (p. 1-48)

Intent: To ensure proper design and construction of engineered conveyance system elements.

Conveyance systems are natural and engineered drainage facilities that collect, contain, and provide for the flow of surface and storm water. This core requirement applies to the engineered elements of conveyance systems—primarily pipes, culverts, and ditches/channels.

1.2.4.1 CONVEYANCE REQUIREMENTS FOR NEW SYSTEMS

All *new conveyance system elements*,²⁵ both onsite and offsite, shall be analyzed, designed, and constructed according to the following requirements. Also see Section 4.1 for route design and easement requirements.

Pipe Systems

1. New pipe systems shall be designed with sufficient capacity to convey and contain (at minimum) the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. Pipe system structures may overtop for runoff events that exceed the 25-year design capacity, provided the overflow from a 100-year runoff event does not create or aggravate a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-32). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, this overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.
3. The upstream end of a pipe system that receives runoff from an open drainage feature (pond, ditch, etc.) shall be analyzed and sized as a culvert as described below.

Culverts

1. New culverts shall be designed with sufficient capacity to meet the headwater requirements in Section 4.3.1 and convey (at minimum) the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. New culverts must also convey as much of the 100-year peak flow as is necessary to preclude creating or aggravating a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-32). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, this overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.
3. New culverts proposed in streams with salmonids shall be designed to provide for fish passage as detailed in Section 4.3.2. *Note: The City critical areas regulations (IMC 18.10) or the State Department of Fish and Wildlife may require a bridge to facilitate fish passage.*

²⁵ *New conveyance system elements* are those that are proposed to be constructed where there are no existing constructed conveyance elements.

Ditches/Channels

1. New ditches/channels shall be designed with sufficient capacity to convey and contain, at minimum, the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. New ditches/channels must also convey as much of the 100-year peak flow as is necessary to preclude creating or aggravating a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement 2, Section 1.2.2 (p. 1-32). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, such overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.

Tightline Systems Traversing Steep Slopes

New tightline conveyance systems traversing slopes that are steeper than 15% and greater than 20 feet in height, or are within a ***steep slope hazard area***, shall be designed with sufficient capacity to convey and contain (at minimum) the 100-year peak flow, assuming *full build-out conditions*²⁶ for all tributary areas, both onsite and offsite. Tightline systems shall be designed as detailed in Section 4.2.2.

Bridges

New bridges shall be designed to accommodate the 100-year peak flow as specified in Section 4.3.3. A minimum of 1.0 foot of freeboard shall be incorporated into the design.

1.2.4.2 CONVEYANCE REQUIREMENTS FOR EXISTING SYSTEMS

The following conveyance requirements for existing systems are less rigorous than those for new systems to allow some salvaging of existing systems that are in useable condition. Existing systems may be utilized if they are capable of providing a minimum level of protection as-is or with minor modifications.

Existing Onsite Conveyance Systems

No Change in Flow Characteristics: Existing onsite conveyance systems that will not experience a change in flow characteristics (e.g., peak flows or volume of flows) as a result of the proposed project need not be analyzed for conveyance capacity.

Change in Flow Characteristics: Existing onsite conveyance systems that will experience a change in flow characteristics as a result of the proposed project must comply with the following conveyance requirements:

1. The existing system must be analyzed and shown to have sufficient capacity to convey and contain the 25-year peak flow assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. The applicant must demonstrate that the 100-year peak flow to the existing system will not create or aggravate a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-32).
3. Minor modifications may be made to the conveyance system to achieve the required capacity stated above. Examples of minor modifications include raising a catch-basin rim, replacing or relaying a section of pipe to match the capacity of other pipes in the system, improving a pipe inlet, or enlarging a short, constricted reach of ditch or channel.
4. Modifications to an existing conveyance system or element that acts to attenuate peak flows, due to the presence of detention storage upstream, shall be made in a manner that does not significantly

²⁶ *Full build-out conditions* means the tributary area is developed to its full zoning potential except where there are existing sensitive areas, open space tracts, and/or native growth protection easements/covenants.

increase peak flows downstream. For example, if water is detained in a pond upstream of a restrictive road culvert, then installing an overflow system for the culvert should prevent overtopping of the road without significantly reducing existing detention storage.

Existing Offsite Conveyance Systems

1. Existing offsite conveyance systems need not be analyzed for conveyance capacity except as required by Core Requirement #2, or if offsite improvements or direct discharge are proposed per Core Requirement #3.
2. Improvements made to existing offsite conveyance systems to address the problem-specific mitigation requirements in Section 1.2.2.2 (p. 1-29) need only change existing conveyance capacity sufficient to prevent aggravation of the drainage problem(s) being addressed.
3. Existing offsite conveyance systems proposed to be used for direct discharge to Lake Sammamish (a *major receiving water*) per Core Requirement #3 (p. 1-32) shall meet the same conveyance requirements specified in Section 1.2.4.1 (p. 1-46) for new systems.

1.2.4.3 CONVEYANCE SYSTEM IMPLEMENTATION REQUIREMENTS

Conveyance systems shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions:

A. METHODS OF ANALYSIS AND DESIGN

Properly sized conveyance elements provide sufficient hydraulic capacity to convey peak flows of the return frequencies indicated in Sections 1.2.4.1 and 1.2.4.2. Conveyance capacity shall be demonstrated using the methods of analysis detailed in Chapter 4. Design flows for sizing conveyance systems shall be determined using the appropriate runoff computation method specified in Section 3.2.

B. COMPOSITION

Where feasible, conveyance systems shall be constructed of vegetation-lined channels, as opposed to pipe systems. Vegetative channels shall generally be considered feasible if all of the following conditions are present:

1. The channel gradient generally does not exceed 5 percent, AND
2. No modifications to currently adopted standard roadway cross sections in the *City of Issaquah Street Standards* are necessitated by the channel, AND
3. The channel will be accessible for maintenance (see Section 1.2.6), AND
4. The channel will not be subject to erosion.

Exceptions: The following are exceptions to the requirement for vegetative channels:

- Conveyance systems proposed under roadways, driveways, or parking areas
- Conveyance systems proposed between houses in urban-zoned plats and short plats
- Conveyance systems conveying roof runoff only.

C. INTERFLOW AND INTERCEPTION

Interflow is near-surface groundwater that moves laterally through the soil horizon following the hydraulic gradient of underlying relatively impermeable soils. When interflow is expressed on the surface, it is termed a *spring* or *seepage*. Any significant springs or seepage areas that impact a roadway or structure proposed by the project must be intercepted and directed into a conveyance system. Where roadways may

impede the passage of interflow to downstream wetlands or streams, provision for passage of unconcentrated flows must be made.

D. PROVISION FOR LOT DRAINAGE WITHIN SUBDIVISIONS

Within *subdivision projects*,²⁷ provision must be made for the safe conveyance of runoff from the discharge location of each lot to the subdivision's main conveyance system or road drainage system. This may include, but is not limited to, **provisional stub-outs** from an enclosed roadway drainage system to the edge of the road right-of-way at each created lot, or lot-line pipes or ditches that collect lot drainage and convey it to the subdivision's main conveyance system or road drainage system.

E. OUTFALLS

An *outfall* is defined as a point where collected and concentrated surface and storm water runoff is discharged from a pipe system or culvert.

Energy Dissipation: At a minimum, rock erosion protection is required at outfalls from all drainage systems and elements except where The City of Issaquah determines that erosion protection is being provided by other means or is not needed. Details on outfall structures are included in Section 4.2.2.

New Point Discharges Over Steep Slopes: Proposed outfalls that will discharge runoff in a location where the natural (existing) discharge is unconcentrated over a slope steeper than 15% and greater than 20 feet in height, or over a ***steep slope hazard area*** (as defined in IMC 18.10), must meet the following criteria:

1. IF the 100-year peak discharge is less than or equal to 0.2 cfs²⁸ under existing conditions and will remain less than or equal to 0.2 cfs under developed conditions, THEN outfall runoff may be discharged onto a rock pad shaped to disperse flow. The outfall and rock pad must be located upstream from any ***landslide*** or ***steep slope hazard area*** buffer and no less than 50 feet from the top of a ***steep slope hazard area*** unless otherwise approved by The City of Issaquah based on an evaluation/report by a geotechnical engineer.
2. IF the 100-year peak discharge is greater than 0.2 cfs but less than or equal to 0.5 cfs under existing conditions and will remain less than or equal to 0.5 cfs under developed conditions, THEN runoff must be conveyed to a dispersal trench or other dispersal system. The dispersal trench or system must be located upstream from any ***landslide*** or ***steep slope area*** buffer and no less than 50 feet from the top of a ***steep slope hazard area*** unless otherwise approved by The City of Issaquah based on an evaluation/report by a geotechnical engineer.
3. IF the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, THEN a tightline conveyance system must be constructed to convey the runoff to the bottom of the slope unless other measures are approved by the City of Issaquah based on an evaluation/report by a geotechnical engineer. Tightline systems must be designed so that existing baseflow conditions are not significantly changed and adequate energy dissipation is provided at the bottom of the slope.

F. OUTFALLS TO THE GREEN RIVER

Section deleted; not applicable to the City of Issaquah.

²⁷ For purposes of this requirement, the term *subdivision project* refers to any project that creates a short plat, plat, or binding site plan.

²⁸ Peak discharges shall be as computed using KCRTS or WWHM as detailed in Chapter 3.

G. SPILL CONTROL PROVISIONS

Projects proposing to construct or replace onsite conveyance system elements that receive runoff from non-roof-top ***pollution-generating impervious surface*** must provide a spill control device as detailed in Section 4.2.1 prior to discharge from the ***project site*** or into a ***natural onsite drainage feature***.²⁹ More specifically, this requirement applies whenever a proposed project does either of the following:

- Constructs a new onsite conveyance system that receives runoff from non-roof-top ***pollution-generating impervious surface***, OR
- Removes and replaces an existing onsite conveyance system element that receives runoff from 5,000 square feet or more of non-roof-top ***pollution-generating impervious surface*** onsite.

The intent of this device is to temporarily detain oil or other floatable pollutants before they enter the downstream drainage system in the event of an accidental spill or illegal dumping. It may consist of a tee section in a manhole or catch basin, or another alternative as specified in Section 4.2.1.

H. GROUNDWATER PROTECTION

Any reach of new ditch or channel proposed by a project in which the untreated runoff from 5,000 square feet or more of ***pollution-generating impervious surface*** comes into direct contact with an outwash soil must be lined with either a ***low permeability liner*** or a ***treatment liner*** consistent with the specifications for such liners in Section 6.2.4, except where it can be demonstrated that the soil has the following properties that reduce the risk of groundwater contamination:

1. The soil has a ***measured infiltration rate***³⁰ of less than or equal to 9 inches per hour, except in ***groundwater protection areas*** where the measured rate must be less than or equal to 2.4 inches per hour, OR
2. The soil has a measured infiltration rate greater than 9 inches per hour, is not located within a ***groundwater protection area*** or within one-quarter-mile of a ***sensitive lake***³¹, and the first 2 feet of the soil beneath the ditch/channel must meet one of the following specifications for general protection of groundwater:
 - a) The soil must have a ***cation exchange capacity***³² greater than 5 and an ***organic content***³³ greater than 0.5%, OR
 - b) The soil must be composed of less than 25% gravel by weight with at least 75% of the soil passing the #4 sieve, and the portion passing the #4 sieve must meet one of the following gradations:
 - At least 50% must pass the #40 sieve and at least 2% must pass the #100 sieve, OR
 - At least 25% must pass the #40 sieve and at least 5% must pass the #200 sieve.

The intent of this requirement is to reduce the likelihood that pollutants will be discharged to groundwater when untreated runoff is conveyed in ditches or channels constructed in soils with high infiltration rates.

²⁹ ***Natural onsite drainage feature*** means a natural swale, channel, stream, closed depression, wetland, or lake.

³⁰ ***Measured infiltration rate*** shall be as measured by the EPA method or the Double Ring Infiltrometer Method (ASTM D3385). For some soils, an infiltration rate of less than 9 inches per hour may be assumed based on a soil texture determination rather than a rate measurement. For more details, see the "Groundwater Protection" requirements in Section 5.4.1.

³¹ ***Sensitive lake*** is a designation applied by the City to lakes that are particularly prone to eutrophication from development-induced increases in phosphorus loading. This includes Lake Sammamish in accordance with the adopted Issaquah Creek Basin and Nonpoint Action Plan.

³² ***Cation exchange capacity*** shall be tested using EPA Laboratory Method 9081.

³³ ***Organic content*** shall be measured on a dry weight basis using ASTM D2974.

I. PUMP SYSTEMS

Pump systems may be used to convey water from one location or elevation to another or to operate a detention system provided they meet the design criteria specified for such systems in Section 4.2.3. Pump systems in stormwater facilities dedicated to the City of Issaquah shall be permitted only if a gravity system is not practical, the developer has made a concerted effort to demonstrate that offsite mitigation is not feasible or is excessively costly, and the pump system conforms to City of Issaquah standards. Pump systems that don't meet City design criteria shall remain under private ownership and operation.

1.2.5 CORE REQUIREMENT #5: EROSION AND SEDIMENT CONTROL

All proposed projects that will clear, grade, or otherwise disturb the *site* must provide erosion and sediment controls to prevent, to the maximum extent practicable, the transport of sediment and other pollutants from the *project site* to downstream drainage facilities, water resources, and adjacent properties. To prevent sediment transport as well as other impacts related to land-disturbing activities, **Erosion and Sediment Control (ESC)** [called **Temporary Erosion and Sediment Control (TESC)** at the City of Issaquah] measures that are appropriate to the *project site* must be applied as described in Section 1.2.5.1 and shall perform as described in Section 1.2.5.2.

Note: the City of Issaquah's TESC program is significantly different from that required by the King County Manual and Ecology's Construction Stormwater General Permit. A summary of the TESC program follows:

- TESC plan review is conducted as part of a Public Works Permit for Sediment and Erosion Control, and is required for any site involving land disturbance for a project associated with a Public Works or Building Permit, in accordance with IMC Chapter 16.30.050, Erosion and Sediment Control. Projects that do not trigger drainage review may still be subject to Erosion and Sediment Control review under a Public Works Permit.
- To be in compliance with the permit, discharge from the project site shall not exceed 100 NTUs (nephelometric turbidity units) at all times up to the 10 year/24 hour storm event. This event is defined as 3.5 inches of rainfall over a 24 hour period, as measured at the City's rain gage (rain data is posted on the City's web site).
- **City of Issaquah staff will conduct monitoring to verify compliance.** The TESC supervisor may wish to have a turbidity meter onsite to monitor surface and stormwater discharges to be able to address inadequate BMPs measures or unforeseen circumstances before exceeding the 100 NTU limit. This will help to ensure compliance with the TESC permit requirements.
- Monitoring points shall be identified on the TESC plan for all locations where runoff discharges from the site and for all phases of construction. The City will measure the turbidity of the discharge at the monitoring points to verify compliance with the 100 NTU discharge limit.
- Updates to the TESC plan are required if the project construction or other circumstances cause changes to the TESC facilities or strategies to meet the requirements herein.
- **TESC Enforcement.** The City may issue a **Stop Work Order and/or a civil penalty under Code Enforcement**, as allowed under IMC Chapter 16.30, for the following reasons:
 1. Turbidity at the monitoring point exceeds 100 NTUs,
 2. Runoff discharges from the project site at locations other than those designated as monitoring points on the TESC plan,
 3. Failure to install TESC facilities prior to initiation of construction activities,
 4. Failure to maintain TESC facilities,
 5. Failure to provide access to monitoring points,
 6. Failure to submit updated TESC plans to reflect changed site conditions,
 7. Failure to have an approved TESC supervisor available at the site to direct implementation of the TESC plan,
 8. Permits may be revoked during the wet weather season (October 1st to April 30th) for repeated violations of the approved TESC plans, or

9. Any other failure to meet the requirements of an approved TESC plan and Public Works Permit.

Note on sites requiring a Department of Ecology Construction Stormwater General Permit:

Construction sites that disturb more than one acre (and smaller sites that are part of a common plan of development or sale) are required to obtain a Construction Stormwater General Permit from the Department of Ecology. As required by the Ecology permit, a copy of the Stormwater Pollution Prevention Plan (SWPPP) and the monthly discharge monitoring reports (DMRs) shall be provided to the City of Issaquah upon request, and weekly site inspection reports shall be readily available at the project site.

1.2.5.1 ESC MEASURES

Each of the following categories of ESC measures must be considered for application to the *project site* as detailed in the *Erosion and Sediment Control (ESC) Standards*, adopted as Appendix D of the King County manual:

1. Clearing Limits
2. Cover Measures
3. Perimeter Protection
4. Traffic Area Stabilization
5. Sediment Retention
6. Surface Water Collection
7. Dewatering Control
8. Dust Control
9. Flow Control

1.2.5.2 TESC PERFORMANCE AND COMPLIANCE PROVISIONS

The changing conditions typical of construction sites call for frequent field adjustments of existing ESC measures or additional ESC measures in order to meet required performance. In some cases, strict adherence to specified measures may not be necessary or practicable based on *site* conditions or project type. In other cases, immediate action may be needed to avoid severe impacts. Therefore, careful attention must be paid to ESC performance and compliance in accordance with the following provisions:

A. TESC SUPERVISOR

The **applicant must designate a TESC supervisor** who shall be responsible for the performance, maintenance, and review of TESC measures and for compliance with all permit conditions relating to TESC as described in the *ESC Standards*. (Note: the applicant is ultimately responsible for permit compliance, regardless of who hires the TESC supervisor). The applicant's selection of a TESC supervisor must be approved by the City. Except for small sites (projects using Appendix C, Small Project Drainage Requirements), the TESC supervisor must be a **Certified Erosion and Sediment Control Lead** as defined by the Department of Ecology. The City may also require a certified TESC supervisor for small sites if Public Works Engineering determines that onsite TESC measures are inadequately installed, located, or maintained.

For larger, more sensitive sites, the City may require a certified TESC supervisor with several years of experience in construction supervision/inspection and a background in geology, soil science, or agronomy (See Appendix D, Section D.4.1 for more information).

B. MONITORING OF DISCHARGES

The City will measure the turbidity of the runoff discharging from the site at the monitoring points designated on the approved TESC plans. The TESC supervisor shall notify the City prior to pumping any discharge offsite.

Monitoring points shall be:

- Located in a catch basin, pond, sump, pipe, or similar structure where runoff can be monitored for turbidity,
- Readily accessible to City personnel,
- Located at or near the property boundary, and
- Located so that all of the construction site runoff drains to the designated monitoring points.

For project sites where designating a monitoring point is not feasible (e.g. flat sites), the monitoring locations shall be at the discretion of the inspector.

If the *project site* is subject to a Construction Stormwater General Permit issued by the Department of Ecology, then the project must also comply with the monitoring requirements of that permit.

C. TESC PERFORMANCE

The following performance criteria replaces the criteria described in Section D.4.3, ESC Performance, of Appendix D of the King County Manual.

TESC measures shall be applied/installed and maintained to prevent, to the maximum extent practicable, the transport of sediment from the *project site* to downstream drainage systems or surface waters or into onsite wetlands, streams, or lakes or onto adjacent properties. This performance is intended to be achieved through proper selection, installation, and operation of the above TESC measures as detailed in the *ESC Standards* (detached Appendix D) and approved by the City. However, the TESC supervisor or the City may determine at any time during construction that the approved measures are not sufficient and that additional action is required. **The City will monitor the discharge from the project site at any time and without notice.** The City inspector will notify the TESC supervisor if the discharge is measured as 25 NTUs or greater.

1. If the turbidity of the discharge from the project site is 25 NTUs or greater, but less than 100 NTUs, the TESC supervisor shall do all of the following:
 - a) Review the TESC plan for compliance and make any appropriate revisions within a timely manner.
 - b) Fully implement and maintain the appropriate TESC measures as soon as possible to avoid exceeding the 100 NTU discharge limit.
 - c) Document the TESC implementation and maintenance in a log book kept at the site. This log book shall be available to City personnel upon request.
2. If the turbidity of the discharge from the project site is 100 NTUs or greater, then the project site is in violation of the TESC permit and a Stop Work Order and/or a civil penalty may be issued under Code Enforcement, in accordance with IMC Chapter 16.30. The TESC supervisor shall do all of the following:
 - a) Review the TESC plan and make appropriate revisions IMMEDIATELY to bring the turbidity below 100 NTU.
 - b) Fully implement and maintain the appropriate TESC measures IMMEDIATELY to avoid additional enforcement action. Notify the City inspector when the revised TESC measures are in place.
 - c) Document the TESC implementation and maintenance in a log book kept at the site. This log book shall be available to City personnel upon request.
 - d) The City inspector shall continue to monitor the discharge from the site daily until:
 - i. the turbidity is 25 NTUs or lower, or,

- ii. the TESC Supervisor has demonstrated compliance with the water quality standard for turbidity:
 - 1) no more than 5 NTUs over the background turbidity, if the background is less than 50 NTUs, or
 - 2) no more than 10% over background turbidity, if the background is 50 NTUs or greater, or
 - 3) the discharge stops or is eliminated.

Civil penalties or other enforcement action may be waived if the permittee demonstrates that the discharge from the project site does not exceed the state water quality standards as defined in Chapter 173-201A of the Washington Administrative Code.

- 3) If the City determines that the condition of the construction site poses a hazard to adjacent property or may adversely impact drainage facilities or water resources, THEN additional measures beyond those specified in Section 1.2.5.1 may be required by the City.

D. FLEXIBLE COMPLIANCE

Some projects may meet the intent of Core Requirement #5 while varying from specific TESC requirements contained here and in the *ESC Standards*. If a project is designed and constructed to meet the intent of this core requirement, the City may determine that strict adherence to a specific TESC requirement is unnecessary; an approved adjustment (see Section 1.4) is not required in these circumstances. Certain types of projects are particularly suited to this greater level of flexibility, for instance, projects on relatively flat, well drained soils, projects that are constructed in closed depressions, or projects that only disturb a small percentage of a forested site may meet the intent of this requirement with very few TESC measures. More information on intent and general TESC principles is contained in the *ESC Standards* in Appendix D.

E. ROADS AND UTILITIES

Road and utility projects often pose difficult erosion control challenges because they frequently cross surface waters and are long and narrow with limited area available to treat and store sediment-laden water. Because of these factors, road and utility projects are allowed greater flexibility in meeting the intent of Core Requirement #5 as described in the *ESC Standards*.

F. ALTERNATIVE AND EXPERIMENTAL MEASURES

All measures proposed for erosion and sediment control shall conform to the details and specifications in the *ESC Standards* unless an alternative is approved by the City, and if the alternative is a new technology, it must also be approved through the state Department of Ecology's CTAPE program (see "Alternative and Experimental Measures" in the *ESC Standards*, detached Appendix D).

1.2.5.3 IMPLEMENTATION REQUIREMENTS

Proposed projects must identify, install, and maintain required erosion and sediment control measures consistent with the following requirements:

A. TESC PLAN AND SWPPS PLAN

Any *site* with exposed soils that is permitted under a Public Works or Building permit shall be subject to the City's Erosion and Sediment Control requirements contained in IMC Chapter 16.30. The applicability of the requirements of Core Requirement #5 will be based on the type and size of the project. The TESC plan must be fully implemented and maintained over the duration of the construction project, and updated during the course of construction sequencing or other changes not reflected in the approved TESC Plan.

Chapter 2 defines the submittal requirements for the following elements relating to Core Requirement #5:

- **TESC plan and Report**
 - **Stormwater Pollution Prevention and Spill (SWPPS) Plan**
- 1) The **TESC plan** must show the location and details of all TESC measures as specified in Chapter 2 and the *ESC Standards*, and shall include a **TESC report**, which contains additional supporting information like a detailed construction sequence and any calculations or information necessary to size TESC measures and demonstrate compliance with Core Requirement #5. The TESC Plan shall also contain plan notes that outline specific permit conditions as required by the City of Issaquah.
 - 2) The **SWPPS plan** identifies all activities that have the potential to pollute stormwater runoff and surface waters during construction. The plan shall include a discussion of the pollution prevention BMPs selected to address each of the following anticipated pollution generating activities. See Chapter 2, Section 2.2.3 for additional information,
 - a. All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater.
 - b. Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks shall include secondary containment.
 - c. Maintenance, fueling and repair of heavy equipment and vehicles shall be conducted using spill prevention and control measures. Contaminated surfaces shall be cleaned immediately following any spill incident.
 - d. Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system or to the sanitary sewer with local sewer district approval.
 - e. Application of fertilizers and pesticides shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' label requirements for application rates and procedures shall be followed.
 - f. BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. Permittees shall require construction site operators to adjust the pH of stormwater if necessary to prevent violations of water quality standards.
 - g. Permittees shall require construction site operators obtain written approval from the Department prior to using chemical treatment other than CO₂ or dry ice to adjust pH.

B. TESC PLAN UPDATES DUE TO CHANGED SITE CONDITIONS

Any changes to the site that require a revision to the ESC measures will require the TESC Plan be updated and submitted to the City for review and approval. The City will require large, complex projects that phase construction to submit multiple TESC plans at different stages of construction. The contractor shall anticipate the need for changes to the TESC Plan that are created by differing site conditions, construction phasing, construction delays, or any other change or condition that wasn't addressed in the original TESC Plan. Failure to provide an updated TESC Plan within 30 days after notification by the City inspector will result in a Stop Work Order, penalties under Code Enforcement, and/or other potential enforcement action.

C. WET SEASON CONSTRUCTION

During the wet season (October 1 to April 30) any site with exposed soils shall be subject to the "Wet Season Requirements" contained in the TESC Standards. In addition to the TESC cover measures, these provisions include covering any newly-seeded areas with mulch and seeding as much disturbed area as possible during the first week of October to provide grass cover for the wet season. Other TESC measures such as baker tanks and portable sand filters may be required for use during the wet season.

D. CONSTRUCTION WITHIN CRITICAL AREAS AND BUFFERS

Any construction that will result in disturbed areas on or within a stream or associated buffer, within a wetland or associated buffer, or within 50 feet of a lake shall be subject to the "Critical Area Restrictions" contained in the *ESC Standards*. These provisions include phasing the project whenever possible so that construction in these areas is limited to the dry season.

E. MAINTENANCE

All TESC measures shall be maintained and reviewed on a regular basis as prescribed in the *ESC Standards* and the Public Works Permit.

F. FINAL STABILIZATION

Prior to obtaining final construction approval, the *site* shall be permanently stabilized, structural TESC measures (such as silt fences and sediment traps) shall be removed, and drainage facilities shall be cleaned as specified in the *ESC Standards*. The TESC Plan or the site planting/vegetation plan shall describe the final stabilization for the site. Final permit approval and return of security will not occur until this work has been completed.

G. CONSIDERATION OF OTHER REQUIRED PERMITS

Consideration should be given to the requirements and conditions that may be applied by other agencies as part of other permits required for land-disturbing activities. In particular, the following permits may be required and should be considered when implementing TESC measures:

- A **Class IV Special Forest Practices Permit** is required by the Washington State Department of Natural Resources for projects that will clear more than two acres of forest or 5,000 board feet of timber. All such clearing is also subject to the State Environmental Policy Act (RCW 43.21C) and will require SEPA review. The City of Issaquah assumes lead agency status for Class IV permits, and the application may be consolidated with the associated City of Issaquah development permit or approval.
- A **Construction Stormwater General Permit** issued by the Washington State Department of Ecology is required for projects that will disturb one or more acres for the purposes of constructing or allowing for construction of a development, or projects disturbing less than one acre that are part of a larger common plan of sale that will ultimately disturb more than one acre.

The developer is responsible for obtaining these permits and all other permits needed for development approval.

1.2.6 CORE REQUIREMENT #6: MAINTENANCE AND OPERATIONS

Maintenance and operation of all drainage facilities is the responsibility of the applicant or property owner, except those facilities for which the City of Issaquah assumes maintenance and operation as described below and in IMC 13.28.080. Drainage facilities must be maintained and operated in accordance with the maintenance standards in Appendix A and Appendix C of this manual, or in other maintenance standards as approved by the City of Issaquah.

Intent: To ensure that the maintenance responsibility for drainage facilities is clearly assigned and that these facilities will be properly maintained and operated in perpetuity.

1.2.6.1 OPERATION AND MAINTENANCE MANUAL REQUIRED

An operation and maintenance manual that is consistent with the provisions in Appendix A is required for all proposed stormwater facilities and BMPs. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. For private facilities approved by the City, a copy of the manual shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner. For public facilities, a copy of the manual shall be retained in the appropriate department. A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection by the City.

The operation and maintenance manual shall be submitted and reviewed as part of Technical Information Report (TIR), as described in Section 2.2.1.

1.2.6.2 MAINTENANCE RESPONSIBILITIES

A. DRAINAGE FACILITIES TO BE MAINTAINED BY THE CITY OF ISSAQUAH

The City of Issaquah will assume maintenance and operation of the following drainage facilities, except where the City of Issaquah grants an adjustment per Section 1.4, allowing the facilities to be maintained by the homeowners association:

- Flow control and water quality facilities within a tract or right-of-way dedicated to the City of Issaquah, serving a residential subdivision with two or more lots in accordance with IMC 13.28.080
- The conveyance system within the public road right-of-way.

The City of Issaquah **will assume maintenance** and operation of these facilities **two years after final construction approval** by the City of Issaquah PWE and an inspection by the City to ensure the facilities have been properly maintained and are operating as designed.

Flow control and water quality facilities, and roads accessing them, to be maintained and operated by the City of Issaquah must be located in a tract or right-of-way dedicated to the City of Issaquah. Underground flow control or water quality facilities (tanks or vaults) may be allowed in private rights-of-way or roads if the easement includes provisions for facility access and maintenance.

Conveyance systems to be maintained and operated by the City of Issaquah must be located in a drainage easement, tract, or right-of-way granted to the City of Issaquah.

B. DRAINAGE FACILITIES TO BE MAINTAINED BY PRIVATE PARTIES

The Issaquah Municipal Code requires maintenance of all privately maintained drainage facilities:

IMC 13.28.090 Maintenance – Drainage Facilities Not Accepted by the City for Maintenance

A. The person or persons holding title to the property and the applicant required to construct a drainage facility shall remain responsible for the facility's continual performance, operation and maintenance in accordance with the standards and requirements of the Department and remain

responsible for any liability as a result of these duties. This requirement shall apply to all facilities not otherwise accepted by the City for maintenance in accordance with IMC 13.28.080. For facilities approved but not accepted by the City, a copy of the operation and maintenance manual prepared in accordance with the approved permit for the facility shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner.

B. The City is authorized to inspect drainage facilities and issue orders requiring maintenance and/or repair in accordance with IMC 13.28.130. Failure to effect such maintenance and/or repairs constitutes a violation of this chapter, and the penalties provided in Chapter 1.36 IMC shall be enforced against the person or persons holding title to the subject property served by the drainage facility,

C. Where not specifically defined in this section, the responsibility for performance, operation and maintenance of drainage facilities and conveyance systems, both natural and constructed, shall be determined on a case-by-case basis

Drainage facilities must be maintained as specified in **Appendix A**, "Maintenance Requirements for Flow Control, Conveyance, and WQ Facilities," in **Appendix C**, "Small Project Drainage Requirements", and as further prescribed in **Chapter 6** for water quality facilities, unless otherwise approved by the City of Issaquah. Additional maintenance requirements may be specified for facilities not identified in Appendix A or Appendix C. Note: A declaration of covenant is not required by the City of Issaquah. As a condition of permits the City of Issaquah may inspect all privately maintained drainage facilities for compliance with these requirements. If the property owner(s) fails to maintain their facilities to the acceptable standards, the City of Issaquah will follow the procedures contained in IMC 13.28.090 to enforce the drainage maintenance standards.

If the proposed project is a **residential subdivision development**, all privately maintained conveyance systems or other drainage facilities that convey flows through private property must be located in **drainage easements dedicated to convey surface and storm water**. Individual owners of the properties containing these easements must maintain the drainage facilities through their property. The legal instrument creating drainage easements on private property must contain language that requires a private property owner to obtain written approval from the City of Issaquah prior to removing vegetation (except by routine mowing) from any drainage easement containing open, vegetated drainage facilities (such as swales, channels, ditches, ponds, etc.).

1.2.7 CORE REQUIREMENT #7: FINANCIAL GUARANTEES AND LIABILITY

Financial guarantees, indemnification and insurance may be required for Public Works Permits that involve clearing and grading, drainage facilities, or other utilities. Evidence of meeting these requirements is not needed for the TIR, but will be required before permits are issued. Posting of all bonds shall be consistent with the City of Issaquah administrative policy for security deposits.

Performance Bond

All permittees shall meet the performance bonding requirements of the Clearing and Grading Code, IMC 13.26.120.

Maintenance Bond for City-Owned Facilities

All permittees shall meet the maintenance bonding requirements of the Stormwater Management Code, IMC 13.28.070 for persons constructing drainage facilities that are to be maintained by the City. These bonds cover the cost of defects in materials, workmanship, and installation, and to correct maintenance deficiencies during the initial 2-year maintenance period following satisfactory completion of the facilities as specified in IMC 13.28.080.

Indemnification and Insurance

All permittees shall meet the indemnification and insurance requirements of the Clearing and Grading Code, included in IMC Chapter 16.26.130 and 16.26.135, respectively.

1.2.8 CORE REQUIREMENT #8: WATER QUALITY

All proposed projects, including **redevelopment projects**, must provide water quality (WQ) facilities to treat the runoff from those new and replaced **pollution-generating impervious surfaces** and new **pollution-generating pervious surfaces** targeted for treatment as specified in the following sections. These facilities shall be selected from a menu of treatment facility options specified by the area-specific facility requirements in Section 1.2.8.1 (p. 1-63) and implemented according to the applicable WQ implementation requirements in Section 1.2.8.2 (p. 1-68).

Intent: To require an efficient, cost-effective level of water quality treatment tailored to the sensitivities and resource protection needs of the downstream receiving water to which the **project site** drains, or, in the case of infiltration, protection of the receiving groundwater system.

Definition of Water Quality (WQ) Treatment Areas in Issaquah

The City of Issaquah is located within the Lake Sammamish watershed. In accordance with the adopted Issaquah Creek Final Basin Nonpoint Action Plan and unless specified otherwise, WQ treatment facilities in the City of Issaquah shall be designed to the **Sensitive Lake WQ Treatment menu** requirement. However, the **Basic WQ Treatment** can be applied under the following cases:

- Where stormwater is infiltrated, **Basic WQ treatment** is required if soils do not meet the Soil Treatment Exemption. (Note: if soils meet the Soil Treatment Exemption, only pre-settling is required prior to infiltration).
- **Basic WQ treatment** can be used for **redevelopment projects** having total land disturbance of <1.0 acre.
- **Basic WQ treatment** can be used for sites where sufficient water quality credits are obtained for phosphorus control per Section 6.1.3.

Certain types of projects will also need to meet the **Enhanced Basic WQ Treatment** menu.

Guide to Applying Core Requirement #8

Facilities shall be provided to remove pollutants from runoff discharging from a **project site** in accordance with one of the three area-specific WQ facility requirements found in Section 1.2.8.1 (p. 1-63). In Issaquah two area-specific facility requirements are identified: **Basic WQ Treatment Areas** and **Sensitive Lake WQ Treatment Areas**. (Note: the **Sphagnum Bog WQ Treatment menu** is deleted from this Addendum because it doesn't apply to Issaquah).

The facility requirement for these WQ treatments areas includes an area-specific menu of treatment facility options, the types of surfaces from which runoff must be treated ("target surfaces"), and any exceptions to the menu and surfaces requirements.

To apply Core Requirement #8, the following steps are recommended:

1. Check the exemption language on page 1-62 to determine if or which **threshold discharge areas** of the **project site** must provide WQ treatment facilities per Core Requirement #8.
2. Determine the appropriate **WQ Treatment Menu**.
3. Comply with the requirements to determine which water quality treatment facilities meet the WQ treatment menu. Refer to Tables 1.1.9.B and Table 1.1.9.C for treatment facility options (this list will be updated on the City's web site as new facilities are approved by Ecology).
4. Consult Section 1.2.8.2 (p. 1-68) for other design requirements, allowances, and flexible compliance provisions related to implementing water quality treatment. Other Ecology-approved guidance may also be used for design.

Other Important Information about Core Requirement #8

Core Requirement #8 is the primary component of an overall water quality protection strategy required by this manual. Other requirements include the following:

- Core Requirement #4: **Conveyance System, Spill Control Provisions**, Section 1.2.4 (p. 1-50)—This provision generally applies whenever a project constructs or replaces onsite conveyance system elements that receive runoff from *pollution-generating impervious surfaces*. The provision requires that runoff from such impervious surfaces be routed through a spill control device prior to discharge from the *project site* or into a natural onsite drainage feature.
- Core Requirement #4: **Conveyance System, Groundwater Protection**, Section 1.2.4 (p. 1-50) — This provision requires that ditches/channels be lined as needed to reduce the risk of groundwater contamination when they convey runoff from *pollution-generating impervious surfaces* that comes into direct contact with an outwash soil.
- Special Requirement #4: **Source Control**, Section 1.3.4 (p. 1-69)—This requirement applies water quality source controls from the *King County Stormwater Pollution Prevention Manual* to those projects proposing to develop or redevelop a commercial, industrial, or multifamily *site*.
- Special Requirement #5: **Oil Control**, Section 1.3.5 (p. 1-72)—This requirement applies special oil controls to those projects proposing to develop or redevelop a *high-use site*.

❑ EXEMPTIONS FROM CORE REQUIREMENT #8

There are five possible exemptions from the requirement to provide a **water quality treatment facility** per Core Requirement #8:

1. Surface Area Exemption for New Development Projects

A proposed project or any *threshold discharge area* within the *site* of a project is exempt if it meets all of the following criteria:

- a) Less than 5,000 square feet of *new PGIS* that is **not fully dispersed** will be added, AND
- b) Less than 5,000 square feet of *new plus replaced PGIS* that is **not fully dispersed** will be created as part of a *redevelopment project*, AND
- c) Less than 35,000 square feet of *new PGPS* that is **not fully dispersed** will be added.

2. Impervious Surface Exemption for Transportation Redevelopment Projects

A proposed *transportation redevelopment project* or any *threshold discharge area* within the *site* of such a project is exempt if it meets all of the following criteria:

- a) The **total new impervious surface** within the project limits is less than 50% of the existing impervious surface, AND
- b) Less than 5,000 square feet of *new PGIS* that is **not fully dispersed** will be added, AND
- c) Less than 35,000 square feet of *new PGPS* that is **not fully dispersed** will be added.

3. Cost Exemption for Parcel Redevelopment Projects

A proposed *redevelopment project* on a single or multiple parcel *site* or any *threshold discharge area* within the *site* of such a project is exempt if it meets all of the following criteria:

- a) The **total valuation** of the project's proposed improvements (including interior improvements and excluding required mitigation improvements) is less than 50% of the assessed value of the existing *site* improvements, AND
- b) Less than 5,000 square feet of *new PGIS* that is **not fully dispersed** will be added, AND

- c) Less than 35,000 square feet of **new PGPS** that is **not fully dispersed** will be added.

4. Soil Treatment Exemption

A proposed project or any drainage area within a project is exempt if the runoff from **pollution-generating impervious surfaces** is infiltrated in soils that meet the "groundwater protection criteria" outlined below, except areas within one-quarter-mile of a *sensitive lake* (i.e., Lake Sammamish), provided that pre-settling prior to infiltration is performed. Otherwise, treatment of stormwater to the Basic WQ Menu is required prior to infiltration.

Groundwater Protection Criteria: The first 2 feet or more of the soil beneath an infiltration facility must have a *cation exchange capacity*³⁴ greater than 5 and an *organic content*³⁵ greater than 0.5% AND meet one of the following specifications for general protection of groundwater:

- a) The soil must have a measured infiltration rate³⁶ of less than 9 inches per hour, except in **groundwater protection areas** where the measured rate must be less than or equal to 2.4 inches per hour, OR
- b) The soil must be composed of less than 25% gravel by weight with at least 75% of the soil passing the #4 sieve, and the portion passing the #4 sieve must meet one of the following gradations:
 - At least 50% must pass the #40 sieve and at least 2% must pass the #100 sieve, OR
 - At least 25% must pass the #40 sieve and at least 5% must pass the #200 sieve.

1.2.8.1 AREA-SPECIFIC WATER QUALITY FACILITY REQUIREMENTS

Projects subject to Core Requirement #8 must provide a water quality treatment facility selected from a menu of treatment facility options identified in the area-specific facility requirements and exceptions for the WQ treatment area in which the proposed project or **threshold discharge area** of the proposed project is located. These WQ treatment areas are listed below and their requirements and exceptions are detailed in the following subsections:

A. Basic WQ Treatment Areas

B. Sensitive Lake WQ Treatment Areas

Intent: To apply an appropriate level of water quality treatment prior to discharge to surface water or infiltration to groundwater.

A. BASIC WQ TREATMENT AREAS

Unless otherwise specified, WQ treatment facilities in the City of Issaquah shall be designed to the **Sensitive Lake WQ Treatment menu** requirement. However, **Basic WQ Treatment** is applicable as follows:

- Where stormwater is infiltrated, **Basic WQ treatment** is required if soils do not meet the Soil Treatment Exemption. (Note: if soils meet the Soil Treatment Exemption, only pre-settling is required prior to infiltration).
- **Basic WQ treatment** can be used for **redevelopment projects** having total land disturbance of <1.0 acre.
- **Basic WQ treatment** can be used for sites where sufficient water quality credits are obtained for phosphorus control per Section 6.1.3.

³⁴ Cation exchange capacity shall be tested using EPA Laboratory Method 9081.

³⁵ Organic content shall be measured on a dry weight basis using ASTM D2974.

³⁶ Measured infiltration rate shall be as measured by the EPA method or the Double Ring Infiltrometer Method (ASTM D3385). For some soils, an infiltration rate of less than 9 inches per hour may be assumed based on a soil texture determination rather than a rate measurement. For more details, see the "Groundwater Protection" requirements in Section 5.4.1.

Required Treatment Menu

Within Basic WQ Treatment Areas, a treatment facility option from the **Basic WQ menu** shall be used to treat runoff from the surfaces listed under "Target Surfaces" below, except where such treatment is waived or reduced by the area-specific exceptions at the end of this subsection and except where the Enhanced Basic WQ menu is applicable as follows. If 50% or more of the runoff that drains to any proposed treatment facility is from one or more of the **following land uses**, then the **Enhanced Basic WQ menu** shall be used in place of the Basic WQ menu for the design of this facility, except if such treatment is waived or reduced by the area-specific exceptions at the end of this subsection:

1. Residential subdivision development in which the actual density of single family units is equal to or greater than 8 units per acre of developed area.
2. Commercial, industrial, or multifamily land use.
3. A road with an expected average daily traffic (ADT) count of 2,000 or more vehicles or expected to serve 200 or more homes.

Treatment Goal and Options

The treatment goal for facility options in the **Basic WQ menu** is 80% removal of total suspended solids (TSS) for a typical rainfall year, assuming typical pollutant concentrations in urban runoff.³⁷ TSS is the general performance indicator for basic water quality protection because it is the most obvious pollutant of concern. The Basic WQ menu includes facilities such as wetponds, combined detention/wetponds, biofiltration swales, filter strips, and sand filters. See Chapter 6 for specific facility choices and design details.

The treatment goal for facility options in the **Enhanced Basic WQ menu** is 50% reduction of total zinc. Zinc is an indicator of a wider range of metals typically found in urban runoff that are potentially toxic to fish and other aquatic life. The Enhanced Basic WQ menu includes options for use of a basic-sized stormwater wetland, a large sand filter, or a combination of two facilities in series, one of which is either a sand filter or a Stormfilter™ leaf compost filter. See Chapter 6 for specific facility options and designs.

Intent

The **Basic WQ menu** is intended to be applied to both stormwater discharges draining to surface waters and those infiltrating into soils that do not provide adequate groundwater protection (see Exemptions 4 and 5 from Core Requirement #8). Overall, the 80% TSS removal objective, in conjunction with special requirements for source control and *high-use site* controls, should result in good stormwater quality for all but the most sensitive water bodies. Increased water quality treatment is necessary for developments that generate the highest concentrations of metals and for developments that drain to sensitive lakes and sphagnum bog wetlands.

Facility options in the **Enhanced Basic WQ menu** are intended to remove more metals than expected from those in the Basic WQ menu. Lower metal concentrations reduce the risk to fish of exposure to both chronic and acutely toxic concentrations of metals such as copper and zinc. As the toxicity of metals depends on their concentration, this standard is most effective for *project sites* with a larger proportion of *pollution-generating impervious surface* like roadways and medium to high density subdivisions. The Enhanced Basic WQ menu is intended to apply to all such *project sites* that drain by surface flows to a fish-bearing stream. However, projects that drain entirely by pipe to the *major receiving waters* listed on page 1-32 are excused from the increased treatment and may revert to the Basic WQ menu because concentration effects are of less concern as the overall flow volume increases.

³⁷ For evaluation purposes, typical concentrations of TSS in Seattle area runoff are between 30 and 100 mg/L (Table 1, "Water Quality Thresholds Decision Paper," King County Surface Water Management Division, April 1994).

Target Surfaces

Facilities in **Basic WQ Treatment Areas** must treat (either directly or in effect) the runoff from the following target surfaces within the **threshold discharge area** for which the facility is required:

1. **New PGIS** that is **not fully dispersed** per the criteria on Page 1-41.
2. **New PGPS** that is **not fully dispersed** and from which there will be a concentrated surface discharge in a natural channel or man-made conveyance system from the **site**. For individual lots within residential subdivision projects, the extent of **new pervious surface** shall be assumed to be the entire lot area, except the assumed impervious portion as specified in Chapter 3 and any portion in which native conditions are preserved by covenant, tract, or easement.
3. **Existing impervious surface** added since January 8, 2001 that is **not fully dispersed** and not yet mitigated with a City-approved water quality facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. **Replaced PGIS** that is **not fully dispersed** on a **transportation redevelopment project** in which **new impervious surface** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
5. **Replaced PGIS** that is **not fully dispersed** on a **parcel redevelopment project** in which the total of new plus **replaced impervious surface** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing **site** improvements.

Exceptions

The following exceptions apply only in **Basic WQ Treatment Areas**:

1. The facility requirement in **Basic WQ Treatment Areas** as applied to **target PGPS** may be waived altogether if there is a good faith agreement with the King Conservation District to implement a farm management plan for agricultural uses, or the City approves a *landscape management plan*³⁸ that controls solids, pesticides, and fertilizers leaving the **site**.
2. The **Enhanced Basic WQ menu** as specified above for certain land uses may be reduced to the **Basic WQ menu** for treatment of any runoff that is infiltrated according to the standards in Section 5.4.
3. The **Enhanced Basic WQ menu** as specified above for certain land uses may be reduced to the **Basic WQ menu** for treatment of any runoff that is discharged directly, via a non-fish-bearing conveyance system, all the way to the ordinary high water mark of Lake Sammamish.
4. The **Enhanced Basic WQ menu** as specified above for treating runoff from a commercial land use may be reduced to the **Basic WQ menu** if all of the following criteria are met:
 - a) No leachable metals (e.g., galvanized metals) are currently used or proposed to be used in areas of the **site** exposed to the weather, AND
 - b) A covenant is recorded that prohibits future such use of leachable metals on the **site**, AND
 - c) Less than 50% of the runoff draining to the proposed treatment facility is from any area of the **site** comprised of one or both of the following land uses:
 - Commercial land use with an expected ADT of 100 or more vehicles per 1,000 square feet of gross building area.
 - Commercial land use involved with vehicle repair, maintenance, or sales.

³⁸ *Landscape management plan* means a City approved plan for defining the layout and long-term maintenance of landscaping features to minimize the use of pesticides and fertilizers, and to reduce the discharge of suspended solids and other pollutants. Submittal requirements are detailed in Section 2.3.1.4.

B. SENSITIVE LAKE WQ TREATMENT AREAS

The City of Issaquah is located within the Lake Sammamish watershed. In accordance with the adopted Issaquah Creek Final Basin Nonpoint Action Plan and, unless specified or exempted otherwise in this chapter, WQ treatment facilities in the City of Issaquah shall be designed to the **Sensitive Lake WQ Treatment menu** requirement.

The Enhanced Basic WQ Treatment menu may also apply to certain types of projects, as described below.

Required Treatment Menu

Within Sensitive Lake WQ Treatment Areas, a treatment facility option from the **Sensitive Lake Protection menu** shall be used to treat runoff from the surfaces listed under "Target Surfaces" below, except where such treatment is waived or reduced by the area-specific exceptions at the end of this subsection and except where the **Enhanced Basic WQ menu** is applicable as follows. If 50% or more of the runoff that drains to any proposed treatment facility is from one or more of the **following land uses**, then a treatment facility option common to both the **Sensitive Lake Protection menu** and **Enhanced Basic WQ menu** shall be used for the design of this facility, except if such treatment is waived or reduced by the area-specific exceptions at the end of this subsection:

1. Residential subdivision development in which the actual density of single family units is equal to or greater than 8 units per acre of developed area.
2. Industrial, commercial, or multifamily development.
3. A road with an expected ADT count of 2,000 or more vehicles or expected to serve 200 or more homes. *Note: those roads defined in the City of Issaquah Street Standards as residential and residential collector or higher are assumed to meet this definition.*

Treatment Goal and Options

The treatment goal for facility options in the Sensitive Lake Protection menu is 50% annual average total phosphorus (TP) removal assuming typical pollutant concentrations in urban runoff.³⁹ This goal was chosen as a realistic and cost-effective level of phosphorus removal. The Sensitive Lake Protection menu includes options for using either Basic WQ facilities of larger size, combinations of two facilities in series,⁴⁰ or a single facility in combination with land use planning elements that reduce phosphorus. See Chapter 6 for specific facility options and design details.

On some developments or portions thereof that have surface uses that generate the highest concentrations of metals in stormwater runoff, the treatment goal is expanded to include 50% reduction of total zinc. This expanded goal requires use of a treatment facility option that is common to both the Sensitive Lake Protection menu and the Enhanced Basic menu.

Intent

A project discharging runoff via surface flow contributes phosphorus loading to a sensitive lake regardless of distance from the lake. If discharge is via infiltration through coarse soils, it is also possible that phosphorus would be transported through the ground for some distance without attenuation. This groundwater transport distance is considered to be typically no more than one-quarter mile. Therefore, onsite treatment using the **Sensitive Lake Protection menu** is required prior to infiltration within one-quarter mile of a sensitive lake. Infiltration through finer soils is expected to provide significant attenuation of TP, so the general groundwater protection criteria specified on page 1-63 under "Soil Treatment Exemption" are considered sufficient for infiltration through finer soils.

Where the treatment goal is expanded to include 50% reduction of total zinc, the facility options common to both the Sensitive Lake Protection menu and the Enhanced Basic WQ menu should meet

³⁹ Phosphorus concentrations of between 0.10 and 0.50 mg/L are considered typical of Seattle area runoff (Table 1, "Water Quality Thresholds Decision paper," King County Surface Water Management Division, April 1994).

⁴⁰ *In series* means that the entire treatment water volume flows from one facility to the other in turn.

this goal as well as the lake protection goal of 50% removal of annual average total phosphorous. The intent behind the 50% reduction of total zinc goal and why it is applied is described on Page 1-64.

Target Surfaces

Facilities in **Sensitive Lake WQ Treatment Areas** must mitigate (either directly or in effect) the runoff from the following target surfaces within the **threshold discharge area** for which the facility is required:

1. **New PGIS** that is **not fully dispersed** per the criteria on Page 1-41. For individual lots within residential subdivision projects, the extent of **new PGIS** shall be assumed based on expected driveway size as approved by the City of Issaquah.
2. **New PGPS** that is **not fully dispersed** and from which there will be a concentrated surface discharge in a natural channel or man-made conveyance system from the **site**. For individual lots within residential subdivision projects, the extent of **new pervious surface** shall be assumed to be the entire lot area, except the assumed impervious portion as specified in Chapter 3 and any portion in which native conditions are preserved by covenant, tract, or easement. *Note: where the runoff from target PGPS is separated from the runoff from target PGIS, the Basic WQ menu may be used in place of the Sensitive Lake Protection menu for treatment of runoff from the target PGPS (see the area-specific exceptions at the end of this subsection).*
3. **Existing impervious surface** added since January 8, 2001 that is **not fully dispersed** and not yet mitigated with a City-approved water quality facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. **Replaced PGIS** that is **not fully dispersed** on a **transportation redevelopment project** in which **new impervious surface** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
5. **Replaced PGIS** that is **not fully dispersed** on a **parcel redevelopment project** in which the total of new plus **replaced impervious surface** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing **site** improvements.

Exceptions

The following exceptions apply only in **Sensitive Lake WQ Treatment Areas**:

1. The **Basic WQ menu** may be used in place of the **Sensitive Lake Protection menu** for treatment of any **runoff that is infiltrated** according to the standards in Section 5.4, provided the infiltration facility is not located in soils having *high infiltration rates*⁴¹ within one-quarter-mile of the lake's mean-high-water level. If the infiltration facility is located beyond the one-quarter-mile limit, the Basic WQ menu (or pre-treatment per Ecology criteria) may be used regardless of the infiltration rate.
2. The **Basic WQ menu** or the **Enhanced Basic WQ menu** (if applicable to site) may be used in place of the **Sensitive Lake Protection menu** if sufficient water quality credits for phosphorus control are obtained for the site according to the method in Section 6.1.3.
3. The **Basic WQ menu** may be used in place of the **Sensitive Lake Protection menu** for redevelopment projects involving less than 1.0 acres of total land disturbance (See Table 1.1.1.A).
4. Application of the **Enhanced Basic WQ menu** as specified above for certain land uses may be waived for treatment of any runoff that is infiltrated according to the standards in Section 5.4.
5. Application of the **Enhanced Basic WQ menu** as specified above for certain land uses may be waived for treatment of any runoff that is discharged, via a non-fish-bearing conveyance system, all the way to the ordinary high water mark of Lake Sammamish.

⁴¹ *High infiltration rates* are those in excess of 9 inches per hour as measured by the EPA method or the Double Ring Infiltrometer method (ASTM D3385). These will typically be medium to coarse sand or gravel soil with low silt content. See Section 5.4.1 for information on measuring infiltration rates.

6. The **Enhanced Basic WQ menu** as specified above for commercial land uses may be waived if leachable metals (e.g., galvanized metals) are not used in areas exposed to the weather and a covenant is recorded that prohibits future such use of leachable metals on the *site*.
7. The **Basic WQ menu** may be used for treatment of any runoff from **target PGPS** that is treated separately from the runoff from **target PGIS**.

1.2.8.2 WATER QUALITY IMPLEMENTATION REQUIREMENTS

Water quality treatment facilities shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions. (**Note: unless specifically allowed for a particular project, sand filters will not be approved in facilities to be dedicated to the City of Issaquah**).

A. METHODS OF ANALYSIS AND DESIGN

Water quality treatment facilities shall be analyzed and designed as detailed in Chapter 6.

B. SITING OF TREATMENT FACILITIES

Required treatment facilities shall be located so as to treat the runoff from all target surfaces, except as allowed below under "Treatment Trades" and "Untreated Discharges."

Any other onsite or offsite runoff draining to a proposed treatment facility must be treated whether it is from a **target pollution-generating surface** or not and regardless of whether the runoff has already been treated by another facility. The facility must be sized for all flows/volumes entering the facility. This is because treatment effectiveness is determined in part by the total volume of runoff entering the facility.

C. TREATMENT TRADES

The runoff from **target pollution-generating surfaces** may be released untreated if an existing non-targeted pollution-generating surface of equivalent size and pollutant characteristics lying within the same watershed or stream reach tributary area is treated on the *project site*. Such substitution is subject to the following restrictions:

1. The existing non-targeted pollution-generating surface is not currently being treated, is not required to be treated by any phase of the proposed project, is not subject to NPDES or other permit requirements, and is not under a compliance order or other regulatory action, AND
2. The proposal is reviewed and approved by the City of Issaquah.

D. UNTREATED DISCHARGES

If *site* topographic constraints are such that runoff from a **target pollution-generating surface** must be pumped to be treated by the required water quality facility, then the City of Issaquah may allow the area's runoff to be released untreated provided that all of the following conditions are met:

1. Treatment of the constrained area by filter strip, biofiltration, or a linear sand filter is not feasible, and a **treatment trade** as described above is not possible.
2. The untreated target surface is less than 5,000 square feet of *new PGIS* and is less than 5,000 square feet of new plus *replaced PGIS* on a *redevelopment project*.
3. Any **target PGPS** within the area to be released untreated shall be addressed with a *landscape management plan* (see Section 2.3.1.5).

E. APPROVED WATER QUALITY FACILITIES

Treatment facilities other than those identified in Chapter 6 are allowed on an experimental basis if it can be demonstrated that they are likely to meet the pollutant removal goal for the applicable receiving water. Use of such facilities requires an experimental design adjustment to be approved by the City according to Section 1.4, "adjustment Process". In addition, any new treatment technologies must be approved through the state Department of Ecology's *TAPE program*⁴² before the technology can be approved by the City. When sufficient data on performance has been collected and if performance is acceptable, the new facility will be added to the appropriate water quality menu for common use through a blanket adjustment or update of this manual.

Unless explicitly allowed, sand filters are not approved in tracts or other facilities to be dedicated to the City of Issaquah.

F. OWNER RESPONSIBILITY FOR WATER QUALITY

Regardless of the means by which a property owner chooses to meet the water quality requirements of this manual – whether a treatment facility, a train of facilities, a treatment trade or an experimental treatment facility – it is the responsibility of the property owner to ensure that runoff from their *site* does not create water quality problems or degrade beneficial uses downstream. It is also the responsibility of the property owner to ensure that the discharge from their property is not in violation of City of Issaquah prohibitions on illegal discharges contained in IMC 13.28.025, state and federal laws.

⁴² *TAPE* stands for Technology Assessment Protocol – Ecology. For more information, see Ecology's website at <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>.

1.3 SPECIAL REQUIREMENTS

This section details the following five special drainage requirements that may apply to the proposed project depending on its location or *site*-specific characteristics:

- "Special Requirement #1: Other Adopted Area-Specific Requirements," Section 1.3.1
- "Special Requirement #2: Flood Hazard Area Delineation," Section 1.3.2
- "Special Requirement #3: Flood Protection Facilities," Section 1.3.3
- "Special Requirement #4: Source Control," Section 1.3.4
- "Special Requirement #5: Oil Control," Section 1.3.5
- "Special Requirement #6: Low Impact Development", Section 1.3.6

1.3.1 SPECIAL REQUIREMENT #1: OTHER ADOPTED AREA-SPECIFIC REQUIREMENTS

Not applicable to the City of Issaquah. All requirements are incorporated into the Surface Water Design Manual, this Addendum, and/or other applicable City codes.

1.3.2 SPECIAL REQUIREMENT #2: FLOOD HAZARD AREA DELINEATION

Not applicable to Drainage Review in the City of Issaquah. Permitting of activities located in Areas of Special Flood Hazard (the 100-year floodplain as mapped on Federal Emergency Management Agency Flood Insurance Rate Maps) is through the Flood Hazard Permit. Areas of special flood hazard is also a critical area designation, defined and regulated in IMC 16.36, which are also reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

1.3.3 SPECIAL REQUIREMENT #3: FLOOD PROTECTION FACILITIES

Not applicable to Drainage Review in the City of Issaquah. Permitting of activities located in Areas of Special Flood Hazard (the 100-year floodplain as mapped on Federal Emergency Management Agency Flood Insurance Rate Maps) is through the Flood Hazard Permit. Areas of special flood hazard is also a critical area designation, defined and regulated in IMC 16.36, which are also reviewed and permitted as part of the critical area review under the Planning Permit, with restrictions or conditions applying to stormwater management facilities as required.

1.3.4 SPECIAL REQUIREMENT #4: SOURCE CONTROLS

Water quality source controls prevent rainfall and runoff water from coming into contact with pollutants, thereby reducing the likelihood that pollutants will enter public waterways and violate water quality standards or City stormwater discharge permit limits. A *Stormwater Pollution Prevention Manual* was prepared for citizens, businesses, and industries to identify and implement source controls for activities that often pollute water bodies. The City of Issaquah provides advice about source control implementation upon request. The City may, however, require mandatory source controls at any time through formal code enforcement if complaints or studies reveal water quality violations or problems.

Threshold	Requirement
IF a proposed project requires a commercial building or commercial site development permit . . .	THEN water quality source controls applicable to the proposed project shall be applied as described below in accordance with the <i>King County Stormwater Pollution Prevention Manual</i> and IMC 13.28.115.

Application of this Requirement

When applicable per the *Stormwater Pollution Prevention Manual*, **structural source control measures**, such as car wash pads or dumpster area roofing, shall be applied to the entire **site** containing the proposed project, not just the **project site**. If the applicant is a tenant or lessee for only a portion of the **site**, the City of Issaquah may limit the entire **site** application of structural source controls to only that portion of the **site** occupied or leased by the applicant. All applicable structural source control measures shall be shown on the site improvement plans submitted for engineering review and approval. Other, **nonstructural source control measures**, such as covering storage piles with plastic or isolating areas where pollutants are used or stored, are to be implemented after occupancy and need not be addressed during the plan review process. All commercial, industrial, and multifamily projects (irrespective of size) undergoing drainage review are required to implement applicable source controls.

1.3.5 SPECIAL REQUIREMENT #5: OIL CONTROL

Projects proposing to develop or redevelop a **high-use site** must provide oil controls in addition to any other water quality controls required by this manual. Such **sites** typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil.

The oil control requirement for **high-use sites** applies to all developments that generate high concentrations of oil, regardless of whether the project creates **new impervious surface** or makes **site** improvements to an existing **high-use site**. The traffic threshold in the definition above focuses on vehicle turnover per square foot of building area (trip generation) rather than ADT alone because oil leakage is greatest when engines are idling or cooling. In general, all-day parking areas are not intended to be captured by these thresholds except those for diesel vehicles, which tend to leak oil more than non-diesel vehicles. The petroleum storage and transfer stipulation is intended to address regular transfer operations like service stations, not occasional filling of heating oil tanks.

Threshold	Requirement
<p>IF a proposed project either:</p> <ul style="list-style-type: none"> • develops a site that will have high-use site characteristics, OR • is a redevelopment project proposing \$100,000 or more of improvements to an existing high-use site . . . 	<p>THEN the project must treat runoff from the high-use portion of the site using oil control treatment options from the High-Use menu (described below and detailed in Chapter 6).</p>

High-Use Menu

High-use oil control options are selected to capture and detain oil and associated pollutants. The goal of this treatment is no visible sheen on runoff leaving the facility, or less than 10 mg/L total petroleum hydrocarbons (TPH) in the runoff, depending on the facility option used. Oil control options include facilities that are small, handle only a limited tributary area, and require frequent maintenance, as well as facilities that treat larger areas and generally have less frequent maintenance needs. Facility choices include catch basin inserts, linear sand filters, and oil/water separators. See Chapter 6 for specific facility choices and design details.

Application of this Requirement

For **high-use sites** located within a larger commercial center, only the impervious surface associated with the high-use portion of the **site** is subject to treatment requirements. If common parking for multiple businesses is provided, treatment shall be applied to the number of parking stalls required for the high-use business only. However, if the treatment collection area also receives runoff from other areas, the treatment facility must be sized to treat all water passing through it.

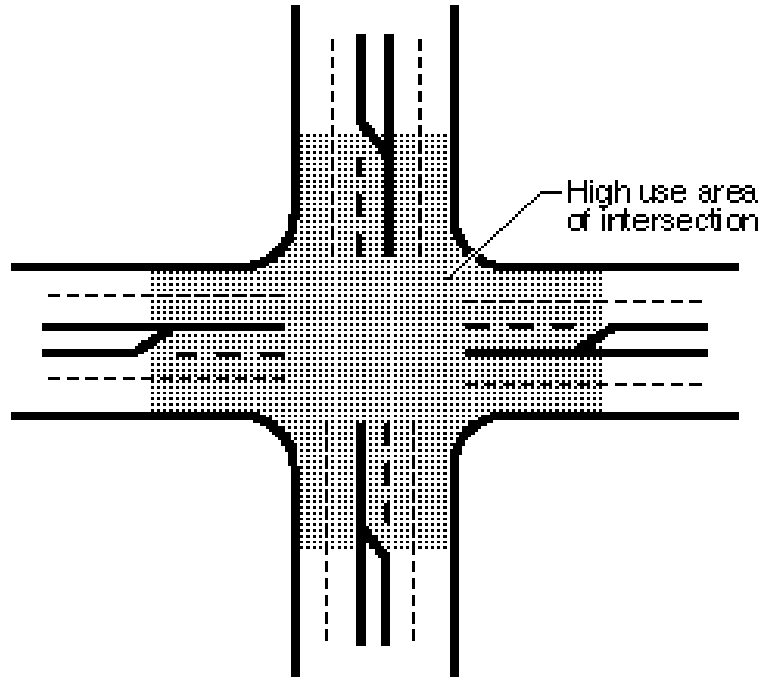
High-use roadway intersections shall treat lanes where vehicles accumulate during the signal cycle, including left and right turn lanes and through lanes, from the beginning of the left turn pocket (see Figure 1.3.5.A below). If no left turn pocket exists, the treatable area shall begin at a distance equal to three car-lengths from the stop line. If runoff from the intersection drains to more than two collection areas that do not combine within the intersection, treatment may be limited to any two of the collection areas.

Note: For oil control facilities to be located in public road right-of-way and maintained by the City of Issaquah, only coalescing plate or baffle oil/water separators shall be used unless otherwise approved through an adjustment.

Methods of Analysis

The traffic threshold for the High-Use menu shall be estimated using information from *Trip Generation*, published by the Institute of Transportation Engineers, or from a traffic study prepared by a professional engineer or transportation specialist with experience in traffic estimation.

FIGURE 1.3.5.A TREATABLE AREAS FOR HIGH-USE ROAD INTERSECTIONS



1.3.6 SPECIAL REQUIREMENT #6: LOW IMPACT DEVELOPMENT

In certain areas of the City of Issaquah, as defined below in the Stormwater LID Classification Map and confirmed by soil and geotechnical information submitted by applicants, **Stormwater Low Impact Development (LID)** must be incorporated into site design using the **flow control BMPs**. These requirements are in addition to the flow control requirements contained in Core Requirement #3, although LID can result in flow control credits that can reduce facility sizes (See Section 1.2.3.2).

Note: *Flow control BMPs must be selected and applied according to the requirements described below, not to requirements contained in Section 5.2.*

Stormwater LID refers to Flow control BMP methods and designs for dispersing, infiltrating, or otherwise reducing or preventing development-related increases in runoff at or near the sources of those increases. Flow control BMPs allowed by the City of Issaquah include those listed in below in Table 1.3.6.A, as well as in current and future Ecology-approved guidance for LID design. Projects that cannot feasibly incorporate LID into the site design can be exempt from Special Requirement #6 as described in Section 1.3.6.5, below.

Intent: Reduce the volume of stormwater runoff leaving development sites to more closely match pre-developed rates to achieve improved infiltration of stormwater into underlying soils thereby reducing the amount of pollutants entering surface water and improving recharge of groundwater aquifers that provide water supply and stream base flows.

1.3.6.1 APPROVED FLOW CONTROL BMPs FOR MEETING LOW IMPACT DEVELOPMENT REQUIREMENT

To meet the stormwater LID requirement development proposals shall incorporate one or more of the approved Flow Control BMPs methods from Table 1.3.6.A. The methods are described in Section 5.4 (full infiltration only) and Appendix C, Section C.2 (all others), and in Ecology-approved guidance for LID design.

TABLE 1.3.6.A APPROVED FLOW CONTROL BMPs FOR STORMWATER LID		
BMP Type	Description	Design Reference
Full Dispersion	Disperse runoff into native vegetated area	Section C2.1
Full Infiltration	Infiltration of runoff into the ground using trenches, drywells, vaults, or ponds.	Section 5.4
Limited Infiltration	Infiltration of runoff where soils are not adequate to meet full infiltration design standard.	Section C2.3
Basic Dispersion	Disperse runoff using splash blocks, rock pads, gravel trenches, or sheet flow.	Section C2.4
Rain Garden	Excavated depression for storage, treatment and infiltration of runoff.	Section C2.5
Permeable Pavement	Porous asphalt, concrete, or modular grid pavers that have openings filled with sand.	Section C2.6
Rainwater Harvesting	Collection and storage of roof runoff for domestic and irrigation use.	Section C2.7
Vegetated Roof	Growing medium and plants installed on rooftop.	Section C2.8
Reduced Impervious Surface Credit	Reduce impervious surface area using restricted footprint, wheel strip driveways, minimum disturbance foundation, and open grid decking over pervious surface.	Section C2.9
Native Growth Retention Credit	Voluntary preservation of unencumbered native vegetated surface (e.g., outside of wetland and stream buffers).	Section C2.10

Note: All BMPs provide flow control credits. To meet the Lake Protection standard for water quality treatment, at least 91% of the runoff volume must be infiltrated through soils that meet the soil treatment exemption (see Page 1-61).

1.3.6.2 STORMWATER LID CLASSIFICATION MAP

Stormwater LID is required for development activities that occur within areas defined as moderate permeability or high permeability. At a minimum, the City of Issaquah Stormwater LID Classification Map (Figure 1.3.6.A) shall be used to determine whether LID is required. This map is included in this Addendum for reference but may be updated by the Public Works Engineering Department as new information becomes available. In addition, other soil and geologic information supplied by the applicant during the permitting process may be used to verify soil conditions and whether Stormwater LID is required, even if the site is located outside of the mapped areas on the LID Classification Map.

This map is based on a compilation of generalized soil and geologic mapping from various sources. The soil series in Issaquah was classified into general soil groups (alluvial, outwash, till, and organic) and permeability (low permeability, moderate permeability, and high permeability). Moderate and high permeability is defined as soils having a percolation rate of 0.63 inches per hour or greater. The resulting Stormwater LID Classification Map shows the soil groups as defined by the infiltration capacity. The relationship between permeability rating and soil class is shown in Table 1.3.6.B.

TABLE 1.3.6.B SOIL PERMEABILITY CLASSIFICATION FOR LID		
Permeability Rating	Soil Classes	Hydrologic Groups
Soils Requiring LID		
<u>High Permeability</u>		
Outwash	Everett, Nielton, Ragnar, Indianola	A, B
Alluvial	Puyallup	B
<u>Moderate Permeability</u>		
Outwash (over bedrock)	Ovall, Beausite	C
Mixed Alluvial	Mixed alluvial	not defined
Alluvial	Sultan, Briscot ^a	C, D
Soils Not Requiring LID		
<u>Low Permeability</u>		
Till	Alderwood, Kitsap	C
Organic	Seattle	D
Alluvial	Samamish, Puget, Oridia, Buckley, Bellingham	D

^a Note: Briscot soils have a Soil Hydrologic Group classification of D due mainly to shallow groundwater in these highly variable alluvial soils.

1.3.6.3 SPECIFIC LID REQUIREMENTS

A. When required. Unless otherwise exempt by Section 1.3.6.5, new development or redevelopment projects that propose new and/or replaced impervious surfaces in areas defined as moderate or high soil infiltration in the **Stormwater LID Classification Map** shall be required to incorporate LID into site design.

B. Design guidance. Guidance for design of LID facilities is contained in Appendix C of this manual, in Appendix III-C of the Department of Ecology Stormwater Management Manual for Western Washington (2005), in the Puget Sound Action Team Low Impact Development Technical Guidance Manual for Puget Sound (January 2005), or other guidance manual accepted by King County or the Department of Ecology.

C. Water Quality Treatment. Most LID design guidance, including the King County Manual, describes how LID can provide significant flow control benefits through detention and/or infiltration. Significant reduction in stormwater detention volumes can result. However, these guidance documents often are not clear on how LID can meet the requirements for water quality treatment from pollution generating

pervious and impervious surfaces. Unless otherwise clarified by Ecology, **infiltration of 91% or more of the runoff volume for the treated area, using infiltration LID methods such as bioinfiltration or pervious pavement with either basic treatment or infiltration through soils meeting soil treatment criteria, is needed to meet the water quality treatment requirement in Core Requirement #8.**

Regardless of how LID is implemented, all sites must meet the flow control and water quality treatment requirements in Core Requirements #3 and #8 for surface water discharges. These requirements must be carefully considered when adapting LID to a project.

D. LID requirements. LID must be incorporated into the site design based in the following order of selection:

1. **Full infiltration.** Applicants must evaluate whether infiltration is feasible at their proposed development site. Infiltration of all site runoff using an engineered facility, termed Full Infiltration as defined in Section 5.4, shall be used if soils underlying the lower elevation portion of the development site (or where stormwater facilities could feasibly be located) exhibit characteristics that would feasibly allow for stormwater infiltration at the site. The facility shall be designed to infiltrate 90% or more of the annual runoff volume from the site's impervious area, or as can feasibly be done.
2. **Full LID** As an alternative to full infiltration, the City may allow other LID methods in Table 1.3.6.A to meet this requirement. The LID methods shall be designed to manage runoff from 90% or more of the site's impervious area, or as can feasibly be done.
3. **Limited LID.** For sites where infiltration rates or soil textural classification indicates a design infiltration rate that is not feasible for infiltration, LID methods shall be used to the maximum extent feasible. In general, these projects have soils consisting of silty sand (loamy sand or sandy loam) having design infiltration rates of less than about 2 inches per hour. At a minimum, projects must manage all stormwater from non-pollution generating surfaces (i.e., roof runoff) using LID to the maximum extent feasible.

E. LID Not Allowed. Stormwater LID is not permitted in high use sites where oil control is required per Special Requirement #5. The City may prohibit use of LID in other projects where proposed site use is incompatible with the goals of LID. For example: the use of pervious asphalt in areas where high sediment loading onto the pavement may occur.

1.3.6.4 VOLUNTARY USE OF LID

Development proposals that are not regulated under this Section can incorporate LID into the site design as allowed by the Surface Water Design Manual. Benefits to developers can be derived from the use of LID, such as impervious surface credits that reduce the sizes of detention and treatment facilities, Leadership in Energy and Environmental Design (LEED) certification, and others. Adjustments from City standards must follow the approval process contained in IMC 13.28.055.

1.3.6.5 EXEMPTIONS

Incorporation of stormwater LID facilities under Special Requirement #6 may be exempted during project review if any one of the following applies to the project.

A. LID FEASIBILITY

The goal of LID is to achieve flow control and/or water quality treatment benefits to reduce or eliminate the need for conventional stormwater facilities that are required by Core Requirements #3 and #8. The LID requirements contained herein are not intended to create the unintended consequence whereby the required LID has no significant functional purpose for stormwater control or is redundant to facilities required by Core Requirements #3 and #8. The City will not require LID if the LID facility can't be designed to reduce the size of these conventional systems. However, the City expects the applicant to fully evaluate the feasibility of using LID at a site, and include LID designs that can be reasonably incorporated into the project design.

B. THRESHOLD FOR REQUIRING INFILTRATION

LID is not required if the amount of new and replaced impervious surface area is below the thresholds required for flow control. Any impervious surface served by an infiltration facility designed in accordance with the flow control facility requirement (Section 1.2.3.2), the facility implementation requirements (Section 1.2.3.3), and the design criteria for infiltration facilities (Section 5.4) is exempt from the flow control BMPs requirement.

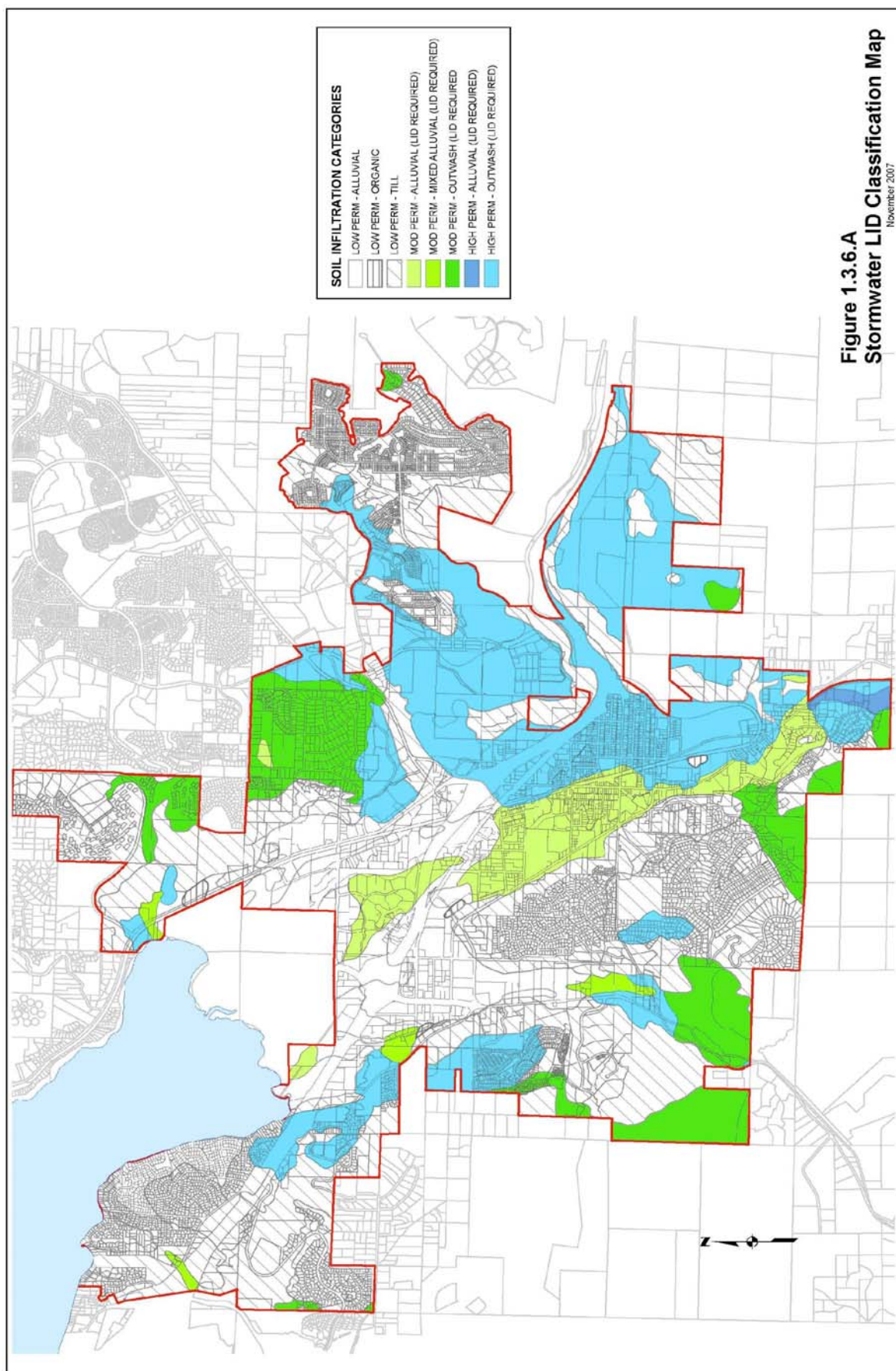
C. UNSUITABLE SITE SOILS

Where soils are demonstrated to be not favorable (i.e., high groundwater, steep slopes, or poor soils) the City can exempt the site from the stormwater LID requirements. The applicant is required to provide sufficient detailed technical information during permit review to clearly demonstrate that such site conditions exist.

To exempt a site due to poor soils the applicant must obtain soil samples from at least two locations to verify soil infiltration properties. Adequate soil tests consisting of, at a minimum, soil logs and grain size analysis shall be conducted by a qualified engineer or soil scientist. The samples must be collected in areas where LID features will be located. Textural classifications can be used to adequately describe the characteristics of soils underlying the site. (See the U.S.D.A. Textural Triangle in Figure 5.4.1.A). Soils that are texturally classified as gravel, sand, sandy loam, loamy sand, or a combination thereof, with minor amounts of clay or silt shall be assumed to have adequate for stormwater LID. The City shall review the soil data interpretation submitted by the applicant. In the event that the data or interpretation is deemed inadequate by the City, the applicant shall obtain the services of an additional qualified soils expert to obtain additional samples and/or prepare a new interpretation. Further testing may be required to verify the design infiltration rates if Full Infiltration is required (see Section 1.3.6.3).

D. DRAINAGE OR SLOPE HAZARDS

Where use of LID could create slope stability or drainage problems on adjacent property the site can be exempted from the stormwater LID requirements. The applicant is required to provide sufficient detailed technical information during permit review to clearly demonstrate that such site conditions exist.



Note: Full sized figure is available from City web site (<http://www.ci.issaquah.wa.us/Page.asp?NavID=1465>).

1.4 ADJUSTMENT PROCESS

In accordance with IMC 13.28.050, adjustments from the standards may only be granted by the Director.

For proposed projects subject to drainage review by the Public Works Engineering Department (PWE), this process is provided for the occasions when a project proponent desires to vary from one of the core or special requirements, or any other specific requirement or standard contained in this manual. Proposed adjustments should be approved prior to final permit approval, but they may be accepted up to the time the City of Issaquah approves final construction or accepts drainage facilities for maintenance.

Adjustment application, review and approval procedures are provided in the Surface Water Design Manual, except that applications shall be submitted to the Director. Conditions may be imposed upon the granting of any adjustment. Unless otherwise specified, the granting of an adjustment shall be subject to all plans, specifications and conditions set forth in the application. The City may require monitoring of experimental designs and technology or untested applications proposed by the applicant in order to determine compliance with this section and the approved plans and conditions.

Types of Adjustments

To facilitate the adjustment process and timely review of adjustment proposals, the following types of adjustments are provided:

- **Standard Adjustments:** These are adjustments of the standards and requirements contained in the following chapters and sections of this manual:

- * Chapter 2, "Drainage Plan Submittal"
- * Chapter 4, "Conveyance System Analysis and Design"
- * Chapter 5, "Flow Control Design"
- * Appendix C, *Small Project Drainage Requirements* (detached)
- * Appendix D, *Erosion and Sediment Control Standards* (detached).

Requests for standard adjustments will be accepted only for permits pending approval or approved permits that have not yet expired.

- **Complex Adjustments:** Complex adjustments typically require more in-depth review because they deal with more complicated requirements or requirements that affect basic City policies or other agencies. These adjustments apply to the requirements contained in the following chapters and sections of this manual:

- * Chapter 1, "Drainage Review and Requirements"
- * Chapter 3, "Hydrologic Analysis and Design"
- * Chapter 6, "Water Quality Design"
- * Appendix A, "Maintenance Requirements for Flow Control, Conveyance, and WQ Facilities"
- * Appendix B, "Master Drainage Plans."

Requests for complex adjustments will be accepted only for permits pending approval or approved permits that have not yet expired.

- **Preapplication Adjustments:** This type of adjustment may be requested when the applicant needs an adjustment decision to determine if a project is feasible or when the results are needed to determine if a project is viable before funding a full application. The approval of preapplication adjustments is tied by condition to the project proposal presented at a preapplication meeting.
- **Experimental Design Adjustments:** This type of adjustment is used for proposing new designs or methods that are not covered in this manual, that are not uniquely *site* specific, and that do not have sufficient data to establish functional equivalence.

- **Blanket Adjustments:** This type of adjustment may be established by the City based on approval of any of the above-mentioned adjustments. Blanket adjustments are usually based on previously approved adjustments that can be applied routinely or globally to all projects where appropriate. Blanket adjustments are also used to effect minor changes or corrections to manual design requirements or to add new designs and methodologies to this manual.

1.4.1 ADJUSTMENT AUTHORITY

The Director of Public Works Engineering shall have full authority to determine if and what type of adjustment is required for any proposed project subject to drainage review.

1.4.2 CRITERIA FOR GRANTING ADJUSTMENTS

Adjustments to the requirements in this manual may be granted provided that granting the adjustment will achieve the following:

1. Produce a compensating or comparable result that is in the public interest, AND
2. Meet the objectives of safety, function, appearance, environmental protection, and maintainability based on sound engineering judgment.

Also, the granting of any adjustment that would be in conflict with the requirements of any other City department will require review and concurrence with that department.

Criteria Exception

If it can be demonstrated that meeting the above criteria for producing a compensating or comparable result will impose a severe and unexpected economic hardship, approval of the adjustment will require an adjustment **criteria exception** to be approved by the Director. An adjustment that requires a criteria exception may be granted following legal public notice of the adjustment request, the director's proposed decision on the request, and a written finding of fact that documents the following:

1. There are special physical circumstances or conditions affecting the property such that strict application of the criteria for producing a compensating or comparable result would impose a severe and unexpected economic hardship, and every effort has been made to find creative ways to meet the intent of the requirement for which the adjustment is sought, AND
2. Granting the adjustment for the individual property in question will not create a significant adverse impact to public health, welfare, water quality, and properties downstream or nearby, AND
3. The adjustment requires the best practicable alternative for achieving the spirit and intent of the requirement in question.

In addition, the written finding of fact must include the following information as required by the state Department of Ecology per City of Issaquah's 2007 NPDES General Municipal Stormwater Permit:

- The current (pre-project) use of the *site*.
- How application of the requirement for which an adjustment is being requested denies reasonable use of the *site* compared to the restrictions that existed under the 1998 *Surface Water Design Manual*.
- The possible remaining uses of the *site* if the criteria exception were not granted.
- The uses of the *site* that would have been allowed under the 1998 *Surface Water Design Manual*.
- A comparison of the estimated amount and percentage of value loss as a result of the requirements of this manual versus the estimated amount and percentage of value loss as a result of requirements that existed under the 1998 *Surface Water Design Manual*.
- The feasibility for the owner to alter the project to apply the requirements of this manual.

Experimental Design Adjustments

Experimental design adjustments that request use of an experimental water quality facility or flow control facility will be approved by the City on a limited basis if, upon evaluation, the City agrees the following criteria are met:

Conditions for approval of experimental design adjustments may include a requirement for setting aside an extra area and posting a financial guarantee for construction of a conventional facility should the experimental facility fail. Once satisfactory operation of the experimental facility is verified, the set aside area could be developed and the financial guarantee released.

1.4.3 ADJUSTMENT APPLICATION PROCESS

Standard and Complex Adjustments

The application process for standard and complex adjustments is as follows:

- Requests for standard and complex adjustments will be accepted only for permits pending approval or approved permits that have not yet expired.
- The completed adjustment request application forms must be submitted to the City along with sufficient engineering information (described in Chapter 2) to evaluate the request. The application shall note the specific requirement for which the adjustment is sought.
- If the adjustment request involves use of a previously unapproved construction material or construction practice, the applicant should submit documentation that includes, but is not limited to, a record of successful use by other agencies and/or evidence of meeting criteria for quality and performance, such as that for the American Association of State Highway and Transportation Officials (AASHTO) and the American Society of Testing and Materials (ASTM).
- If the adjustment requires a criteria exception, additional engineering or other information may be required by the City to document that denial of reasonable use would occur, that every effort was made to achieve compliance, and that the best practicable alternative will not cause significant adverse impact.
- A fee reduction may be requested if it is demonstrated that the adjustment request requires little or no engineering review.
- If a criteria exception is required for the adjustment, the City will issue a legal public notice of the adjustment request that indicates the City's proposed decision on the request, including the written finding of fact. The public notice will include a 14-day public comment period within which a request for reconsideration may be made to the Public Works Engineering Director. Absent a request for reconsideration, the director's decision becomes final after the 14-day public comment period.

Preapplication Adjustments

The application process is the same as for standard and complex adjustments except that requests will be accepted prior to permit application, but only if:

- The applicant provides justification at a preapplication meeting with the City that an adjustment decision is needed to determine the viability of the proposed project, AND
- Sufficient engineering information to evaluate the request is provided.

Experimental Design Adjustments

The application process is the same as for standard and complex adjustments except that requests will be accepted prior to permit application.

Blanket Adjustments

There is no application process for blanket adjustments because they are initiated and issued solely by the City.

1.4.4 ADJUSTMENT REVIEW PROCESS

The general steps of the review process for specific types of adjustments are presented as follows.

Standard and Complex Adjustments

- City staff will review the adjustment request application forms and documentation for completeness and inform the applicant in writing as to whether additional information is required from the applicant in order to complete the review. The applicant will also be informed if the City determines that special technical support is required from the City in cases where the adjustment involves a major policy issue or potentially impacts a City drainage facility.
- The Public Works Director or his designee will review and either approve or deny the adjustment request following the City's determination that all necessary information has been received from the applicant.
- If a criteria exception is required for the adjustment, the City will issue a legal public notice of the adjustment request that indicates the City's proposed decision on the request, including the written finding of fact. The public notice will include a 14-day public comment period within which a request for reconsideration may be made to the Public Works Engineering Director. Absent a request for reconsideration, the director's decision becomes final after the 14-day public comment period.
- Approvals of standard and complex adjustments will expire upon expiration of the permit to which they apply.

Preapplication Adjustments

The review process is the same as for standard and complex adjustments except that approvals will expire one year after the approval date, unless a complete permit application is submitted and accepted, in which case the adjustment will expire at the same time as the permit to which it applies.

Experimental Design Adjustments.

- City staff will review the submitted material and any City staff recommendations, and inform the applicant as to whether additional information is required in order to complete the review. The City will also give the applicant an estimate of the time needed to complete the review.
- If a criteria exception is required for the adjustment, the City will issue a legal public notice of the adjustment request that indicates the City's proposed decision on the request, including the written finding of fact. The public notice will include a 14-day public comment period within which a request for reconsideration may be made to the Public Works Engineering Director. Absent a request for reconsideration, the director's decision becomes final after the 14-day public comment period.
- The PWE director or designee will review and either approve or deny the adjustment request in writing.

Blanket Adjustments

Blanket adjustments will each be established based on:

1. A previously approved standard, complex, preapplication, or experimental design adjustment and supporting documentation, AND
2. Information presenting the need for the blanket adjustment. Typically, blanket adjustments should apply globally to design or procedural requirements and be independent of *site* conditions.

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CHAPTER 2

DRAINAGE AND TESC PLAN SUBMITTAL



CITY OF ISSAQUAH 2011 ADDENDUM TO KING COUNTY, WASHINGTON SURFACE WATER DESIGN MANUAL

(Effective February 15, 2010 per Ordinance 2560)

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CHAPTER 2

DRAINAGE AND TESC PLAN SUBMITTAL

This chapter details the drainage related submittal requirements for engineering design plans as part of a Public Works Permit application to the City of Issaquah Public Works Engineering Department. Drainage plans must address the requirements contained in Chapter 1, "Drainage Review and Requirements." The specific design methods and criteria to be used are contained in Chapters 3, 4, 5, and 6.

The general submittal requirements for Public Works Permits, which include **engineering plans**, are not addressed in this manual. Contact the City's Permit Center for more information. Submittal requirements will be reviewed during pre-application meetings.

Initial drainage review based on preliminary drainage plans may also be conducted for Planning Department review, such as for a preliminary plat or master site plan, as required by the submittal requirements for Planning Permits. Such reports and plans shall be identified as "preliminary". Full review with final plans and drainage calculations will be required upon review of the Public Works Permit.

Note: Public Works Engineering Standard Plan Notes are available on the City's web site under the Public Works Engineering Department.

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2.1 SUMMARY OF DRAINAGE AND TESC SUBMITTAL REQUIREMENTS

Engineering plans and reports needed for drainage review and approval are described below. Such review is conducted as part of the Public Works Permit.

Updates or revisions to the **Temporary Erosion and Sediment Control (TESC) Plan** may be requested by the City at any time during project construction if the City determines that construction sequencing or changed site conditions require a revision to ESC measures.

2.1.1 LARGE PROJECTS

For large projects (i.e., all but one or two unit residential) **engineering plans** consist of the following:

1. **Site improvement plans** which include all plans, profiles, details, notes, and specifications necessary to construct road, drainage, and off-street parking improvements. For more information refer to the permit submittal requirements documents that are applicable to the development proposal (available from the City's Permit Center, on the Permit Center web site, and from staff during pre-application meetings).
2. **Technical information report (TIR)**, which contains all the technical information and analysis necessary to develop the drainage. The TIR is documented in Section 2.2.1. (Note: TESC is included in the separate TESC Report, below).
3. **Temporary Erosion and Sediment Control (TESC) Plan**, [also called an Erosion and Sediment Control (ESC) plan] are the plan sheets that identify measures and BMPs required to prevent the discharge of sediment-laden water and other pollutants associated with construction and land disturbing activities. These plans are updated as needed during the course of the project to reflect construction phasing and/or changed conditions.
4. **TESC Report**, a separate document that provides additional background information to support the TESC Plan. This document is updated each time the TESC Plan is resubmitted for review and approval.
5. **Stormwater Pollution Prevention and Spill (SWPPS) Plan**, addresses the construction-related pollution-generating activities.

Note: a Stormwater Pollution Prevention Plan (SWPPP) prepared for Ecology's Construction Stormwater General Permit satisfies the City's requirements for the TESC Report and the SWPPS if submitted with the TIR. If the SWPPP is not adequate in addressing the City's requirements, additional documentation will be necessary.

2.1.2 SMALL PROJECTS

Small projects, including **Single Family Residential** (single unit or duplex), usually require less detailed engineering plans. Only certain sections of the technical information report are required to be completed and the site improvement plan may have a limited scope depending upon the characteristics of the proposed project. The scope of these plans should be clarified by Public Works Engineering during pre-design meetings. In general, the following sections of the TIR should be submitted:

1. **Site improvement plans**, as above. The scope of these plans will likely be limited due to relatively small size of these projects. However, drainage details must still be provided in accordance with the *Small Projects Drainage Requirements* booklet (Appendix C).
2. **Technical information report (TIR)** Sections 1, 2 and 6 (i.e., project overview, conditions and requirements, and special reports and studies).

3. **Small Project TESC Plan**, prepared in accordance with the *Small Projects Drainage Requirements* booklet (Appendix C).
4. **TESC Report**, a separate document that provides additional background information to support the TESC Plan. This document is updated each time the TESC Plan is resubmitted for review and approval.

2.1.3 TESC PERMITS ONLY

Projects that involve land clearing activities only as authorized under a Public Works or Building Permit are subject to TESC requirements in accordance with IMC Chapter 16.30, Erosion and Sediment Control. Review of these projects is conducted under a Public Works Permit for erosion and sediment control and is limited to TESC as follows:

1. **Small Project TESC Plan** (as above under Small Projects)
2. **Small Project TESC Report** (as above under Small Projects)

A large project TESC Plan may be required if the City determines that the nature of the project requires additional TESC measures not found in the *Small Projects Drainage Requirements* booklet (Appendix C).

2.2 DRAINAGE REVIEW PLANS AND REPORTS

2.2.1 DRAINAGE PLANS

Site improvement plans include all plans, profiles, details, notes, and specifications necessary to construct road, drainage, and off-street parking improvements. For more information refer to the permit submittal requirements documents that are applicable to the development proposal (available from the City's Permit Center, on the Permit Center web site, and from staff during pre-application meetings).

2.2.2 TECHNICAL INFORMATION REPORT (TIR)

A TIR is a comprehensive report containing all technical information and analysis necessary to document the drainage design for the site improvement plan. This report should contain all calculations, reports, and studies required and used to construct a complete site improvement plan based on sound engineering practices and careful geotechnical and hydrological design. The TIR must be stamped and dated by a *civil engineer*.

The TIR shall contain the following **ten sections**, preceded by a table of contents:

1. Project Overview
2. Conditions and Requirements Summary
3. Offsite Analysis
4. Flow Control and Water Quality Facility Analysis and Design
5. Conveyance System Analysis and Design
6. Special Reports and Studies
7. Other Permits
8. Temporary Erosion and Sediment Control Design
9. Bond Quantities and Declaration of Covenant
10. Operations and Maintenance Manual.

Every TIR must contain each of these sections; however, if a section does not apply, the applicant may simply mark "N/A" with a brief explanation. This standardized format allows a quicker, more efficient review of information required to supplement the site improvement plan.

The **table of contents** should include a list of the ten section headings and their respective page numbers, a list of tables with page numbers, and a list of numbered references, attachments, and appendices.

When the TIR package requires **revisions**, the revisions must be submitted in a complete TIR package.

TIRs that are not final (i.e., are not part of Public Works Permit review for construction) shall be identified as "Preliminary". Preliminary TIRs are typically prepared for preliminary plats, master site plans, and other Planning permits.

❑ TIR SECTION 1 PROJECT OVERVIEW

The project overview must provide a general description of the proposal, predeveloped and developed *site* conditions, *site* and *project site* area, size of the improvements, and the disposition of stormwater runoff before and after development. The overview shall identify and discuss difficult *site* parameters, the natural drainage system, and drainage to and from adjacent property, including bypass flows.

The following figures are required:

Figure 1. TIR Worksheet

Include a copy of the TIR Worksheet (see Reference Section 8-A).

Figure 2. Site Location

Provide a map that shows the general location of the *site*. Identify all roads that border the *site* and all significant geographic features and critical areas (lakes, streams, steep slopes, etc.).

Figure 3. Drainage Basins, Subbasins, and Site Characteristics

This figure shall display the following:

1. Show acreage of subbasins.
2. Identify all *site* characteristics.
3. Show existing discharge points to and from the *site*.
4. Show routes of existing, construction, and future flows at all discharge points and downstream hydraulic structures.
5. Use a minimum USGS 1:2400 topographic map as a base for the figure.
6. Show (and cite) the length of travel from the farthest upstream end of a proposed storm system in the development to any proposed flow control facility.

Figure 4. Soils

Show the soils within the following areas:

1. The *project site*
2. The area draining to the *site*
3. The drainage system downstream of the *site* for the distance of the downstream analysis (see Section 1.2.2).

Copies of King County Soil Survey **maps** may be used; however, if the maps do not accurately represent the soils for a proposed project (including offsite areas of concern), it is the design engineer's responsibility to ensure that the actual soil types are properly mapped. Soil classification symbols that conform to the *SCS Soil Survey for King County* shall be used; and the equivalent KCRTS soil type (till, outwash, or wetlands) shall be indicated (see Table 3.2.2.B).

Projects may need to evaluate the soils on each lot for applicability of the full infiltration flow control BMP as specified in Special Requirement #6, Low Impact Development. This soils report, as well as geotechnical investigations necessary for proposed infiltration facilities, should be referenced in the TIR Overview and submitted under Special Reports and Studies, TIR Section VI. A figure in the required geotechnical report that meets the above requirements may be referenced to satisfy 1, 2, and 3 above.

□ TIR SECTION 2 CONDITIONS AND REQUIREMENTS SUMMARY

The intent of this section is to ensure all preliminary approval conditions and applicable requirements pertaining to *site* engineering issues have been addressed in the site improvement plan. All conditions and requirements for the proposed project should be included.

In addition to the core requirements of this manual, adopted basin plans and other plans as listed in Special Requirement #1 should be reviewed and applicable requirements noted. Critical area requirements, conditions of plat approval, and conditions associated with development requirements (e.g., conditional use permits, rezones, variances and adjustments, SEPA mitigations, etc.) should also be included.

❑ TIR SECTION 3 OFFSITE ANALYSIS

All projects in engineering review shall complete, at a minimum, an Offsite Analysis, except for projects meeting the exemptions outlined in Section 1.2.2. The Offsite Analysis is usually completed as part of the initial permit application and review process, and is to be included in the TIR. *Note: If offsite conditions have been altered since the initial submittal, a new offsite analysis may be required.*

The primary component of the offsite analysis is the **downstream analysis** described in detail below. Upstream areas are included in this component to the extent they are expected to be affected by backwater effects from the proposed project. Other components of the offsite analysis could include, but are not limited to, evaluation of impacts to fish habitat, groundwater levels, groundwater quality, or other environmental features expected to be significantly impacted by the proposed project due to its size or proximity to such features.

Levels of Analysis

The offsite analysis report requirements vary depending on the specific *site* and downstream conditions. Each project submittal shall include at least a Level 1 downstream analysis. Upon review of the Level 1 analysis, Public Works Engineering may require a Level 2 or Level 3 analysis. If conditions warrant, additional, more detailed analysis may be required. *Note: Potential impacts upstream of the proposal shall also be evaluated.*

Level 1 Analysis

The Level 1 analysis is a qualitative survey of each downstream system leaving a *site*. This analysis is required for all proposed projects and shall be submitted with the initial permit application. Depending on the findings of the Level 1 analysis, a Level 2 or 3 analysis may need to be completed or additional information may be required. If further analysis is required, the applicant may schedule a meeting with Public Works Engineering staff.

Level 2 or 3 Analysis

If problems are identified in the Level 1 analysis, a Level 2 (rough quantitative) analysis or a Level 3 (more precise quantitative) analysis may be required to further evaluate proposed mitigation for the problem. City staff will determine whether a Level 2 or 3 analysis is required based on the evidence of existing or potential problems identified in the Level 1 analysis and on the proposed design of onsite drainage facilities. The Level 3 analysis is required when results need to be as accurate as possible: for example, if the *site* is flat; if the system is affected by downstream controls; if minor changes in the drainage system could flood roads or buildings; or if the proposed project will contribute more than 15 percent of the total peak flow to the drainage problem location. The Level 2 or 3 analysis may not be required if Public Works Engineering determines from the Level 1 analysis that adequate mitigation will be provided.

Additional Analysis

Additional, more detailed hydrologic analysis may be required if Public Works Engineering determines that the downstream analysis has not been sufficient to accurately determine the impacts of a proposed project on an existing or potential drainage problem. This more detailed analysis may include a **point of compliance analysis** as detailed in Section 3.3.6.

Scope of Analysis

Regardless of the level of downstream analysis required, the applicant shall define and map the study area (Task 1), review resources (Task 2), inspect the study area (Task 3), describe the drainage system and problems (Task 4), and propose mitigation measures (Task 5) as described below.

Task 1. Study Area Definition and Maps

For the purposes of Task 2 below, the study area shall extend downstream one mile (minimum flowpath distance) from the proposed project discharge location and shall extend upstream as necessary to encompass the offsite drainage area tributary to the proposed *project site*. **For the**

purposes of Tasks 3, 4, and 5, the study area shall extend downstream to a point on the drainage system where the proposed **project site** constitutes a minimum of 15 percent of the total tributary drainage area, but not less than one-quarter mile (minimum flowpath distance). The study area shall also extend upstream of the **project site** a distance sufficient to preclude any back water effects from the proposed project.

The offsite analysis shall include (1) a **site map** showing property lines, and (2) the **best available topographical map** (available from Public Works Engineering) with the study area boundaries, **site** boundaries, downstream flowpath, and potential/existing problems (Task 4) shown. Other maps, diagrams, and photographs such as aerial photos may be helpful in describing the study area.

Task 2. Resource Review

To assist the design engineer in preparing an offsite analysis, Public Works Engineering can provide maps and information regarding existing and potential flooding and erosion problems. Information needs will be evaluated on a case-by-case basis and discussed during pre-application meetings. Potential/existing problems identified in the above documents shall be documented in the **Level 1 Downstream Analysis Report**.

Task 3. Field Inspection

The design engineer shall physically inspect the existing on- and offsite drainage systems of the study area for each discharge location. Specifically, he/she shall investigate any evidence of the following existing or potential problems and drainage features:

Level 1 Inspection:

1. Investigate any problems reported or observed during the resource review.
2. Locate all existing/potential constrictions or lack of capacity in the existing drainage system.
3. Identify all existing/potential downstream drainage problems as defined in Section 1.2.2.1.
4. Identify existing/potential overtopping, scouring, bank sloughing, or sedimentation.
5. Identify significant destruction of aquatic habitat or organisms (e.g., severe siltation, bank erosion, or incision in a stream).
6. Collect qualitative data on features such as land use, impervious surfaces, topography, and soil types.
7. Collect information on pipe sizes, channel characteristics, drainage structures, and relevant critical areas (e.g., wetlands, streams, steep slopes).
8. Verify tributary basins delineated in Task 1.
9. Note the date and weather conditions at the time of the inspection.

Level 2 or 3 Inspection:

1. Perform a Level 1 Inspection.
2. Document **existing site conditions** (approved drainage systems or pre-1979 aerial photographs) as defined in Core Requirement #3.
3. Collect quantitative field data. For Level 2, collect non-survey field data using hand tapes, hand reel, and rods; for Level 3, collect field survey profile and cross-section topographic data prepared by an experienced surveyor.

Task 4. Drainage System Description and Problem Descriptions

Each drainage system component and problem shall be addressed in the offsite analysis report on a map (Task 1) and in the narrative (Task 4).

Drainage System Descriptions: The following information about drainage system components such as pipes, culverts, bridges, outfalls, ponds, tanks, and vaults shall be included in the report:

1. Location (corresponding map label and distance downstream/upstream from *site* discharge)
2. Physical description (type, size, length, slope, vegetation, and land cover)
3. Problems
4. Field observations.

Problem Descriptions: All existing or potential problems (e.g., ponding water, high/low flows, siltation, erosion, etc.) identified in the resource review or field inspection shall be described in the offsite analysis. These descriptions will help in determining if such problems are one of three defined problem types that require special attention per Core Requirement #2 (see Section 1.2.2.1). Special attention may include more analysis, additional flow control, or other onsite or offsite mitigation measures as specified by the problem-specific mitigation requirements set forth in Section 1.2.2.2.

The following information shall be provided for each existing or potential problem:

1. Description of the problem (ponding water, high or low flows, siltation, erosion, slides, etc.).
2. Magnitude of or damage caused by the problem (siltation of ponds, dried-up ornamental ponds, road inundation, flooded property, flooded building, flooded septic system, significant destruction of aquatic habitat or organisms).
3. General frequency and duration of problem (dates and times the problem occurred, if available).
4. Return frequency of storm or flow (cfs) of the water when the problem occurs (for Levels 2 and 3 only). *Note: A Level 2 or 3 analysis may be required to accurately identify the return frequency of a particular downstream problem; see Section 3.3.3.*
5. Water surface elevation when the problem occurs (e.g., elevation of building foundation, crest of roadway, elevation of septic drainfields, or wetland/stream high water mark).
6. Names and concerns of involved parties (optional for all levels of analysis).
7. Current mitigation of the problem.
8. Possible cause of the problem.
9. Whether the proposed project is likely to aggravate (increase the frequency or severity of) the existing problem or create a new one based on the above information. For example, an existing erosion problem should **not** be aggravated if Level 2 flow control is already required in the region for the design of onsite flow control facilities. Conversely, a downstream flooding problem inundating a home every 2 to 5 years will likely be aggravated if only Level 1 flow control is being applied in the region. See Section 1.2.3.1 for more details on the effectiveness of flow control standards in addressing downstream problems.

Task 5. Mitigation of Existing or Potential Problems

For any existing or potential offsite drainage problem determined to be one of the three defined problem types in Section 1.2.2.1, the design engineer must demonstrate that the proposed project neither aggravates (if existing) nor creates the problem as specified in the problem-specific mitigation requirements set forth in Section 1.2.2.2. To meet these requirements, the proposed project may need to provide additional onsite flow control as specified in Table 1.2.3.A (see also Section 3.3.5), or other onsite or offsite mitigation measures as described in Section 3.3.5.

❑ TIR SECTION 4 FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

Existing Site Hydrology (Part A)

This section of the TIR should include a discussion of assumptions and *site* parameters used in analyzing the existing *site* hydrology.

The acreage, soil types, and land covers used to determine existing flow characteristics, along with basin maps, graphics, and exhibits for each subbasin affected by the development, should be included.

The following information must be provided on a topographical map:

1. Delineation and acreage of areas contributing runoff to the *site*
2. Flow control facility location
3. Outfall
4. Overflow route.

The scale of the map and the contour intervals must be sufficient to determine the basin and subbasin boundaries accurately. The direction of flow, the acreage of areas contributing drainage, and the limits of development should all be indicated on the map.

Each subbasin contained within or flowing through the *site* should be individually labeled and KCRTS/WWHM parameters referenced to that subbasin.

All natural streams and drainage features, including wetlands and depressions, must be shown. Rivers, closed depressions, streams, lakes, and wetlands must have the 100-year floodplain (and floodway where applicable) delineated as required in Special Requirement #2 (see Section 1.3.2) and by the critical areas requirements.

Developed Site Hydrology (Part B)

This section should provide narrative, mathematical, and graphical presentations of parameters selected and values used for the developed *site* conditions, including acreage, soil types and land covers, roadway layouts, and all constructed drainage facilities and any required flow control BMPs.

Developed subbasin areas and flows should be clearly depicted on a map and cross-referenced to computer printouts or calculation sheets. Relevant portions of the calculations should be highlighted and tabulated in a listing of all developed subbasin flows.

All maps, exhibits, graphics, and references used to determine developed *site* hydrology must be included, maintaining the same subbasin labeling as used for the existing *site* hydrology whenever possible. If the boundaries of the subbasin have been modified under the developed condition, the labeling should be modified accordingly (e.g., Subbasin "Am" is a modified version of existing Subbasin "A").

Performance Standards (Part C)

The design engineer shall include brief discussions of the following:

- The applicable **area-specific flow control facility standard** determined from the Flow Control Applications Map per Section 1.2.3.1, any modifications to the standard to address onsite or offsite drainage conditions, and applicable **flow control BMP requirements** determined from Sections 1.2.3.3 and 5.2;
- The applicable **conveyance system capacity standards** per Section 1.2.4; and
- The applicable **area-specific water quality treatment menu** determined from the Water Quality Applications Map per Section 1.2.8.1, and any applicable special requirements for **source control** or **oil control** determined from Sections 1.3.4 and 1.3.5.

Flow Control System (Part D)

This section requires an illustrative sketch (or copy of the design plans) of the flow control facility (or facilities), required flow control BMPs, and appurtenances. The facility sketch (or sketches) must show basic measurements necessary to calculate the storage volumes available from zero to the maximum head, all orifice/restrictor sizes and head relationships, control structure/restrictor orientation to the facility, and facility orientation on the *site*. The flow control BMP sketch (or sketches) must show basic measurements and dimensions, orientation on the *site*, flowpath lengths, etc.

The applicant should include all supporting documentation such as computer printouts, calculations,

equations, references, storage/volume tables, graphs, and any other aides necessary to clearly show results and methodology used to determine the storage facility volumes. KCRTS/WWHM facility documentation files, "Compare Flow Durations" files, peaks files, return frequency or duration curves, etc., should be included to verify the facility meets the performance standards indicated in Part C. The volumetric safety factor used in the design should be clearly identified, as well as the reasoning used by the design engineer in selecting the safety factor for this project. If flow control BMP credits are used as allowed in Section 5.2.2, documentation must be provided, explaining how the credits will be used and how the criteria for use of credits will be met.

Water Quality System (Part E)

This section provides an illustrative sketch (or copy of the design plans) of the proposed water quality facility (or facilities), source controls, oil controls, and appurtenances. This sketch (or sketches) of the facility, source controls, and oil controls must show basic measurements and dimensions, orientation on the *site*, location of inflow, bypass, and discharge systems, etc.

The applicant should include all supporting documentation such as computer printouts, calculations, equations, references, and graphs necessary to show the facility was designed and sized in accordance with the specifications and requirements in Chapter 6. If the water quality credit option is used as allowed in Section 6.1.2, documentation must be provided, identifying the actions that will be taken to acquire the requisite credits.

❑ TIR SECTION 5 CONVEYANCE SYSTEM ANALYSIS AND DESIGN

This section should present a detailed analysis of any existing conveyance systems, and the analysis and design of the proposed stormwater collection and conveyance system for the development. This section would also include any analysis required for the design of bridges to convey flows and pass sediments and debris per Section 4.4.3. Analysis information should be presented in a clear, concise manner that can be easily followed, checked, and verified. All pipes, culverts, catch basins, channels, swales, and other stormwater conveyance appurtenances must be clearly labeled and correspond directly to the engineering plans.

The minimum information included shall be pipe flow tables, flow profile computation tables, nomographs, charts, graphs, detail drawings, and other tabular or graphic aides used to design and confirm performance of the conveyance system.

Verification of capacity and performance must be provided for each element of the conveyance system. The analysis must show design velocities and flows for all drainage facilities within the development, as well as those offsite that are affected by the development. If the final design results are on a computer printout, a separate summary tabulation of conveyance system performance should also be provided.

❑ TIR SECTION 6 SPECIAL REPORTS AND STUDIES

Some *site* characteristics, such as steep slopes or wetlands, pose unique road and drainage design problems that are particularly sensitive to stormwater runoff. As a result, Public Works Engineering may require the preparation of special reports and studies that further address the *site* characteristics, the potential for impacts associated with the development, and the measures that would be implemented to mitigate impacts. Special reports shall be prepared by people with expertise in the particular area of analysis. **Topics of special reports** may include any of the following:

- Critical areas analysis and delineation
- Geotechnical/soils
- Groundwater
- Slope protection/stability
- Erosion and deposition
- Geology

- Hydrology
- Fluvial geomorphology
- Fisheries impacts
- Water quality
- Structural design
- Structural fill.

☐ **TIR SECTION 7 OTHER PERMITS**

Construction of road and drainage facilities may require additional permits from other agencies for some projects. These additional permits may contain more restrictive drainage plan requirements. This section of the TIR should provide the titles of any other permits, the agencies requiring the other permits, and the permit requirements that affect the drainage plan. Examples of other permits are listed in Section 1.1.3.

☐ **TIR SECTION 8 TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN**

Temporary Erosion and Sediment Control requirements are addressed in the TESC Plan, TESC Report, and Stormwater Pollution Prevention and Spill Plan. The TIR can simply reference these documents.

☐ **TIR SECTION 9 BOND QUANTITY WORKSHEET AND DECLARATION OF COVENANT**

Bond Quantities Worksheet

If required, the applicant shall submit a construction cost estimate to establish the security deposit amount to meet the requirements of Core Requirement #7: Financial Guarantees and Liability. The bond quantities worksheet contained in the References section of the drainage manual can be used for this purpose. Drainage facilities for single family residential building permits, which are normally not bonded, shall be constructed and approved prior to granting the certificate of occupancy.

Declaration of Covenant for Privately Maintained Flow Control BMPs

Any declarations of covenant and grant of easement required for proposed flow control BMPs per Section 5.2 must be included here for review and approval before recording. After approval by the City, all such documents must be signed and recorded at the office of King County Records and Elections before any permit is approved.

☐ **TIR SECTION 10 OPERATIONS AND MAINTENANCE MANUAL**

For each flow control and water quality facility that is to be privately maintained, and for those that have special non-standard features, the design engineer shall prepare an operations and maintenance manual. The manual should be simply written and should contain a brief description of the facility, what it does, and how it works. In addition, the manual shall include a copy of the *Maintenance Requirements for Flow Control, Conveyance, and WQ Facilities* (see Appendix A) and provide an outline of maintenance tasks and the recommended frequency each task should be performed. This is especially important for water quality facilities where proper maintenance is critical to facility performance. For this reason, most of the water facility designs in Chapter 6 include "maintenance considerations" important to the performance of each facility.

2.2.3 TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) PLAN AND REPORT

This section details the specifications and contents for TESC plans. Note that a TESC Plan includes 1) plan drawings sheets, and 2) a TESC Report, which provides background information and directions to the contractor for implementing TESC measures and meeting TESC implementation requirements in the field.

The TESC Plan's drawings may be simplified by the use of the symbols and codes provided for each TESC measure in the *Erosion and Sediment Control Standards* (detached Appendix D). In general, the TESC Plan's drawings shall be submitted as a separate plan sheet(s). However, there may be some relatively simple projects where providing separate grading and TESC Plan drawings is unnecessary.

Note: To ensure that erosion and sediment control is effective at construction sites, **TESC Plans must be updated during the course of project construction to reflect construction sequencing or changed site conditions.** Updated plans must be reviewed and approved by the City. Failure to comply with this requirement could result in a Stop Work order or code enforcement action.

□ TESC REPORT

The TESC Report must include all hydrologic and hydraulic information used to analyze and design the erosion and sediment control measures, including final *site* stabilization measures. The report shall explain how proposed TESC measures comply with the *Erosion and Sediment Control Standards* (detached Appendix D) and show compliance with the implementation requirements of Core Requirement #5, Section 1.2.5.

The TESC Report is a separate document and shall include the following:

- Project name and address
- Description of the project, construction activities and sequence, and the schedule for dry and wet season construction
- Provide sufficient information to **justify** the overall TESC Plan and the choice of individual ESC measures. At a minimum, there shall be a discussion of each of the measures specified in Section 1.2.5 and their applicability to the proposed project.
- Include all **hydrologic and hydraulic information** used to analyze and size the ESC facilities shown in the engineering plans. Describe the methodology, and attach any graphics or sketches used to size the facilities.
- Identify areas with a particularly **high susceptibility to erosion** because of slopes or soils. Discuss any special measures taken to protect these areas as well as any special measures proposed to protect water resources on or near the *site*.
- Description of how the TESC measures will be maintained, including any contingency plans for unexpected or extreme weather events.
- If proposing **exceptions or modifications** to the standards detailed in the *Erosion and Sediment Control Standards* (detached Appendix D), clearly present the rationale. If proposing techniques or products different from those detailed in the *ESC Standards*, provide supporting documentation so the City can determine if the proposed alternatives provide similar protection.
- Description of any chemical treatment methods being used and proof of approval from the Department of Ecology (if required).

This information shall be submitted as a separate document each time the TESC Plan is updated.

□ TESC PLAN - GENERAL SPECIFICATIONS

The **site improvement plan** shall be used as the base of the TESC Plan. Certain detailed information that is not relevant may be omitted to make the TESC Plan easier to read. At a minimum, the TESC Plan shall include all of the information required for the base map, as well as existing and proposed roads,

driveways, parking areas, buildings, drainage facilities, utility corridors not associated with roadways, *relevant critical areas*¹ and critical area buffers, and proposed final topography. A smaller scale may be used to provide better comprehension and understanding.

The TESC plan shall generally be designed for proposed topography, not existing topography, since rough grading is usually the first step in *site* disturbance. The TESC Plan shall **address all phases of construction** (e.g., clearing, grading, installation of utilities, surfacing, and final stabilization). If construction is being phased, separate TESC Plans may need to be prepared to address the specific needs for each phase of construction.

The TESC Plan outlines the minimum requirements for anticipated *site* conditions. During construction, **TESC Plans shall be revised as necessary** by the ESC supervisor or as directed by Public Works Engineering to address changing *site* conditions, unexpected storm events, or non-compliance with the ESC performance criteria in Core Requirement #5.

❑ TESC PLAN - SPECIFIC TESC MEASURES

TESC Plan drawings must include the following information specific to applicable TESC measures and implementation requirements. As noted above, this information may need to be updated or revised during the life of the project by the ESC supervisor or as directed by Public Works Engineering.

TESC Standard Plan Notes

1. Include TESC Standard Plan Notes (available from Public Works Engineering) in the TESC plans. This includes certain required notes that are placed on each TESC plan sheet.

Monitoring Point(s)

1. Indicate **monitoring point locations** where stormwater leaves the site and City inspectors can verify compliance with turbidity limits.

Clearing Limits

1. **Delineate** clearing limits.
2. Provide **details** sufficient to install and maintain the clearing limits.

Cover Measures

1. Specify the type and location of **temporary cover measures** to be used onsite.
2. If **more than one type** of cover measure is to be used onsite, indicate the areas where the different measures will be used, including steep cut and fill slopes.
3. If the type of cover measures to be used will vary depending on the time of year, soil type, gradient, or some other factor, specify the **conditions that control the use of the different measures**.
4. Specify the nature and location of **permanent cover measures**. If a landscaping plan is prepared, this may not be necessary.
5. Specify the approximate amount of cover measures necessary to cover all disturbed areas.
6. If **netting, blankets, or plastic sheeting** are specified, provide typical detail sufficient for installation and maintenance.
7. Specify the **mulch types, seed mixes, fertilizers, and soil amendments** to be used, as well as the application rate for each item.
8. For **surface roughening**, describe methods, equipment and areas where surface roughening will be use.

¹ *Relevant critical areas*, for the purposes of drainage review, include aquatic areas, wetlands, **flood hazard areas**, **erosion hazard areas**, **landslide hazard areas**, **steep slope hazard areas**, and **critical aquifer recharge areas**.

9. If **PAM** is used, show location(s) and describe application method.
10. When **compost blankets** are used, show location, application rates, and the name of the supplier to document that compost meets WAC 173-350-22 standards and meets Grade A quality specifications.

Perimeter Protection

1. Specify the **location and type** of perimeter protection to be used.
2. Provide **typical details** sufficient to install and maintain the perimeter protection.
3. If **silt fence** is to be used, specify the type of fabric to be used.
4. If **compost berms or socks** are used, documentation must be provided to assure the supplier meets the criteria under WAC 173-350-220 and compost meets Grade A quality standards.

Traffic Area Stabilization

1. Locate the **construction entrance(s)**.
2. Provide **typical details** sufficient to install and maintain the construction entrance.
3. Locate the **construction roads and parking areas**.
4. Specify the measure(s) that will be used to create **stabilized construction roads and parking areas**. Provide sufficient detail to install and maintain.
5. If a **wheel wash or tire bath system** will be installed, provide location, typical details for installation and maintenance.
6. Provide a list of **dust control** products that will be used onsite and the location of potential application areas.

Sediment Retention

1. Show the **locations** of all sediment ponds and traps.
2. Dimension pond **berm widths** and all inside and outside pond slopes.
3. Indicate the **trap/pond storage** required and the depth, length, and width dimensions.
4. Provide typical **section views** through pond and outlet structures.
5. If **chemical or electrocoagulation treatment** of sediment-laden waters will be used, approval documentation from DOE must be included.
6. Provide details for **disposal of contaminated or chemically treated waters** (e.g., where Chitosan or CO₂ have been used).
7. Include appropriate **approval documentation from local sewer districts** if contaminated or chemically treated water will be discharged to the sanitary sewer.
8. Provide typical details of the **control structure and dewatering mechanism**.
9. Detail **stabilization techniques** for outlet/inlet protection.
10. Provide details sufficient to install **cell dividers**.
11. Specify mulch or recommended **cover of berms and slopes**.
12. Indicate the **required depth gage** with a prominent mark at 1-foot depth for sediment removal.
13. Indicate **catch basins** that are to be protected.
14. Provide **details of the catch basin protection** sufficient to install and maintain.

Surface Water Control

1. **Locate** all pipes, ditches, interceptor ditches, dikes, and swales that will be used to convey stormwater.
2. Provide **details** sufficient to install and maintain all **conveyances**.
3. Indicate locations of **outlet protection** and provide detail of protections.

4. Indicate locations and outlets of any possible **dewatering systems**. Provide details of alternative discharge methods from dewatering systems if adequate infiltration rates cannot be achieved.
5. Indicate the location of any **level spreaders** and provide details sufficient to install and maintain.
6. Show all **temporary pipe inverts**.
7. Provide location and specifications for the **interception of runoff from disturbed areas** and the conveyance of the runoff to a non-erosive discharge point.
8. Provide **locations** of **rock check dams**.
9. Provide **details**, including front and side sections, of typical **rock check dams**.

Wet Season Requirements

1. Provide a **list** of all applicable wet season requirements.
2. Clearly identify that from October 1st through April 30th, no soils shall be exposed for more than two consecutive working days. Also note that this **two-day requirement** may be applied at other times of the year if storm events warrant more conservative measures.
3. Clearly identify that **exposed soils shall be stabilized** at the end of the workday prior to a weekend, holiday, or predicted rain event.

Critical Areas Restrictions

1. **Delineate and label** the following critical areas, and any applicable buffers, that are on or adjacent to the *project site*: aquatic areas, wetlands, *erosion hazard areas*, *landslide hazard areas*, and *steep slope hazard areas*.
2. If construction creates disturbed areas within any of the above listed critical areas or associated buffers, specify the type, locations, and details of any measures or other provisions necessary to **comply with the critical area restrictions** in Appendix D and protect surface waters and steep slopes.

2.2.4 STORMWATER POLLUTION PREVENTION AND SPILL (SWPPS) PLAN

This section details the specifications and contents for **SWPPS plan**, which together with TESC Plans and the TESC Report, comprise the construction stormwater pollution prevention plan that must be submitted as part of the engineering plans required for drainage review. The SWPPS plan must identify all activities that could contribute pollutants to surface and storm water during construction. Updates or revisions to the SWPPS plan may be requested by the City at any time during project construction if the City determines that pollutants generated on the construction site have the potential to contaminate surface, storm, or ground water.

The SWPPS plan must be kept on *site* during all phases of construction and shall **address the construction-related pollution-generating activities outlined in Subsection A below**. The plan must include a description of the methods the general contractor will use to ensure sub-contractors are aware of the SWPPS plan. A **form or record** must be provided that states all sub-contractors have read and agree to the SWPPS plan.

A SWPPS plan consists of the following three elements, which are further described in Subsections B, C, and D below:

1. A **site plan** showing the location and description of BMPs required to prevent pollution and control spills from construction activities and from chemicals and other materials used and stored on the construction site. See Subsection B below for more specifics on the SWPSS site plan.
2. A **pollution prevention report** listing the potential sources of pollution and identifying the operational, source control, and treatment BMPs necessary to prevent/mitigate pollution from these sources. See Subsection C below for more specifics on the SWPSS pollution prevention report.

3. A **spill prevention and cleanup report** describing the procedures and BMPs for spill prevention and including provisions for cleanup of spills should they occur. See Subsection D below for more specifics on the SWPPS spill prevention and cleanup report.

A. ACTIVITY-SPECIFIC INFORMATION REQUIRED

At a minimum, the SWPPS plan shall address, if applicable, the following pollution-generating activities typically associated with construction and include the information specified below for each activity. If other pollution-generating activities associated with construction of the proposed project are identified, the SWPPS plan must address those activities in a similar manner.

Storage and Handling of Liquids

1. Identify liquids that will be handled or stored onsite, including but not limited to **petroleum products, fuel, solvents, detergents, paint, pesticides, concrete admixtures, and form oils**.
2. Specify **types and sizes of containers** of liquids that will be stored/handled onsite. Show locations on the SWPPS site plan.
3. Describe **secondary containment methods** adequately sized to provide containment for all liquids stored onsite. Show the locations of containment areas on the SWPPS site plan.

Storage and Stockpiling of Construction Materials and Wastes

1. **Identify** construction materials and wastes that may be generated or stockpiled onsite. Show the **locations** where these materials and wastes will be generated and stockpiled on the SWPPS site plan.
2. Specify type of **cover measures** to be used to keep rainwater from contacting construction materials and wastes that can contribute pollutants to storm, surface, and ground water.
3. If wastes are kept in **containers**, describe how rainwater will be kept out of the containers.

Fueling

1. Specify **method of onsite fueling** for construction equipment (i.e. stationary tanks, truck mounted tanks, wet hosing, etc.). If stationary tanks will be used, show their location on the SWPPS site plan.
2. Describe **type and size of tanks**.
3. Describe **containment methods for fuel spills** and make reference to the SWPPS site plan for location information.
4. If fueling occurs **during evening hours**, describe lighting and signage plan. Make reference to the SWPPS site plan for location information.

Maintenance, Repairs, and Storage of Vehicles and Equipment

1. Identify **maintenance and repair areas** and show their locations on the SWPPS site plan. Use of drip pans or plastic beneath vehicles is required. A note to this effect must be shown on the SWPPS site plan.
2. Describe method for collection, storage, and disposal of **vehicle fluids**.
3. If an area is designated for vehicle maintenance, **signs must be posted** that state no vehicle washing may occur in the area. A note to this effect must be shown on the SWPPS site plan.

Concrete Saw Cutting, Slurry, and Washwater Disposal

1. Identify **truck washout areas** to assure such areas are not within a **critical aquifer recharge area**. If they are, the washout area must be lined with an impervious membrane. Show location information on the SWPPS site plan.

2. Specify **size of sumps** needed to collect and contain slurry and washwater. Show location information on the SWPPS site plan.
3. Identify **areas for rinsing hand tools** including but not limited to screeds, shovels, rakes, floats and trowels. Show the locations of these areas on the SWPPS site plan.
4. Describe **methods for collecting, treating, and disposal** of waste water from exposed aggregate processes, concrete grinding and saw cutting, and new concrete washing and curing water.

Handling of pH Elevated Water

New concrete vaults/structures may cause collected water to have an elevated pH. This water cannot be discharged to storm or surface water until neutralized.

1. Provide details on **treating/neutralizing water** when pH is not within neutral parameters.
2. Provide details on **disposal of water** with elevated pH or of the treated water.

Application of Chemicals including Pesticides and Fertilizers

1. Provide a **list of chemicals** that may be used on the *project site* and the application rates.
2. Describe **where and how chemicals will be applied**. Show location information on the SWPPS site plan.
3. Describe **where and how chemicals will be stored**. Show location information on the SWPPS site plan.

B. SWPPS SITE PLAN

The *site* plan element of the SWPPS plan shall include all of the information required for the base map, as well as existing and proposed roads, driveways, parking areas, buildings, drainage facilities, utility corridors not associated with roadways, *relevant critical areas*² and associated buffers, and proposed final topography. A smaller scale may be used to provide more comprehensive details on specific locations of each activity and specific prevention measure. In addition to this information, the following items, at a minimum, shall be provided as applicable:

1. Identify locations where **liquids will be stored** and delineate secondary containment areas that will be provided.
2. Identify locations where **construction materials and wastes** will be generated and stockpiled.
3. Identify location of **fueling for vehicles and equipment** if stationary tanks will be used.
4. Delineate **containment areas** for fuel spills.
5. Show location of **lighting and signage** for fueling during evening hours.
6. Delineate **maintenance and repair areas** and clearly note that drip pans or plastic shall be used beneath vehicles. Also, clearly note that signs must be posted that state no **vehicle washing** may occur in the area.
7. Delineate **truck washout areas** and identify the location of **slurry/washwater sumps and rinsing areas** for tools.
8. Delineate where **chemicals** will be applied and identify where they will be stored.
9. Identify where **spill response materials** will be stored.

² *Relevant critical areas*, for the purposes of drainage review, include aquatic areas, wetlands, **flood hazard areas**, **erosion hazard areas**, **landslide hazard areas**, **steep slope hazard areas**, and **critical aquifer recharge areas**.

C. POLLUTION PREVENTION REPORT

This report provides the specifics on pollution prevention and must include the following information in addition to the activity-specific information specified in Subsection A above:

1. List the possible **sources of pollution** per Subsection A above and identify the BMPs to be used for each source to prevent pollution. Include any **supporting information** (site conditions, calculations, etc.) for the selection and sizing of pollution prevention BMPs.
2. Identify the **personnel** responsible for pollution prevention and clearly list the responsibilities of each person identified. **Contact information** for these personnel must be clearly identified in the report and on the SWPPS site plan.
3. Describe the **procedures** to be used for monitoring pollution prevention BMPs and for responding to a BMP that needs attention, including keeping records/reports of all inspections of pollution prevent BMPs (see Reference Section 8-E for examples of worksheets that may be used).

D. SPILL PREVENTION AND CLEANUP REPORT

This report provides the specifics on spill prevention and cleanup and must include the following information in addition to any activity-specific information in Subsection A above related to spill prevention:

1. List the possible **sources of a spill** and identify the BMPs to be used for each source to prevent a spill.
2. Identify **personnel** responsible for spill prevention and cleanup and clearly list the responsibilities of each person identified. **Contact information** for these personnel must be clearly identified in the report and on the SWPPS site plan.

Describe the **procedures** to be used for monitoring spill prevention BMPs and for responding to a spill incident, including keeping records/reports of all inspections and spills (see Reference Section 8-E for examples of worksheets that may be used).

4. Identify where **spill response materials** will be stored. Make reference to the SWPSS site plan for location information.
5. Identify **disposal methods** for contaminated water and soil after a spill.

2.2.4.1 LANDSCAPE MANAGEMENT PLANS (IF APPLICABLE)

Approved landscape management plans are allowed to be used as an alternative to the requirement to formally treat (with a facility) the runoff from pollution generating pervious surfaces subject to Core Requirement #8 (see Section 1.2.8). A *landscape management plan* is a City approved plan for defining the layout and long-term maintenance of landscaping features to minimize the use of pesticides and fertilizers, and reduce the discharge of suspended solids and other pollutants. **General guidance for preparing landscape management plans** is provided in Reference Section 4-C.

If a landscape management plan is proposed, it must be submitted with the engineering plans for the proposed project. The elements listed below are required for evaluation of landscape management plans.

1. Provide a **site vicinity map** with topography.
2. Provide a **site plan** with topography. Indicate areas with saturated soils or high water tables.
3. Provide a **plant list** (provide both common and scientific names) that includes the following information:
 - a) Indicate any drought-tolerant plants, disease resistant varieties, species for attracting beneficial insects (if any) and native plants.
 - b) For shrubs and groundcovers, indicate the proposed spacing.

- c) For turf areas, indicate the grass mix or mixes planned. Indicate sun/shade tolerance, disease susceptibility, drought tolerance and tolerance of wet soil conditions.
- 4. Provide a **landscape plan**. Indicate placement of landscape features, lawn areas, trees, and planting groups (forbes, herbs, groundcovers, etc.) on the *site*.
- 5. Include information on **soil preparation** and fertility requirements.
- 6. Provide information on the design of the **irrigation method** (installed sprinkler system, drip irrigation system, manual, etc.)
- 7. Provide a **landscape maintenance plan**, including the following:
 - a) Physical care methods, such as thatch removal or aeration, and mowing height and frequency
 - b) Type of fertilizer (including N-P-K strength) and fertilization schedule or criteria
 - c) Type of chemicals to be used for common pests such as crane fly larvae, and the criteria or schedule for application
 - d) Any biocontrol methods.
- 8. Provide information about the **storage of pesticides or other chemicals**, and **disposal measures** that will be used.
 - a) If applicable, indicate how the chemicals will be stored on the *site* between applications to prevent contact with stormwater or spills into the storm drainage system.
 - b) Indicate how excess quantities of fertilizers or chemicals will be handled for individual applications.
- 9. Provide an **implementation plan** (see Reference Section 4-C for guidance on preparing the implementation plan).

2.3 PLANS REQUIRED AFTER DRAINAGE REVIEW

This section includes the specifications and contents required of those plans submitted at the end of the permit review process or after a permit has been issued.

2.3.1 UPDATED TESC PLANS

Updates or revisions to the **Temporary Erosion and Sediment Control (TESC) Plan, TESC Report, or SWPPS Plan** may be requested by the City at any time during the term of the permit if these documents are found to be ineffective or construction sequencing or other changed site conditions makes it necessary to modify the original TESC information to make it compliant with the requirements of this manual. Such updates shall be submitted to the City for review and approval within 30 days of the request for an updated TESC Plan. Failure to update a TESC plan, TESC Report, or SWPPS Plan shall be considered a violation of the Public Works Permit, subject to Stop Work and/or enforcement.

2.3.2 PLAN CHANGES AFTER PERMIT ISSUANCE

If changes or revisions to the originally approved engineering plans require additional review, including significant changes to the project that cannot be field-approved, the revised plans shall be submitted to Public Works Engineering for approval prior to construction. The plan change submittals shall be submitted on the **Revision / Correction Submittal Form** (available from Permit Center, or at <http://www.ci.issaquah.wa.us/Page.asp?NavID=539>). Please refer to that form for submittal requirements.

2.3.3 RECORD DRAWING SUBMITTAL

During the course of construction, changes to the approved engineering plans are often required to address unforeseen field conditions or design improvements. Once construction is completed, it is the applicant's responsibility to submit to Public Works Engineering a **record (or as-built) drawing**. These corrected drawings must be professionally drafted revisions applied to the original approved plan and must include all changes made during the course of construction. The final corrected plan must be stamped, signed, and dated by a *civil engineer*, and submitted to Public Works Engineering as an AutoCAD drawing file and reproducible mylar.

Refer to the document entitled "Record Drawing Requirements" for more information on as-built submittals. This document is available on the City's web site under the Permit Center Submittal Requirements page (<http://www.ci.issaquah.wa.us/page.asp?navid=535>).

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